

EDITORIAL

Salvation – It's Just Around the Corner!

With the scientific community suffering through a continuing funding crisis, the Bush administration issued a pledge that "salvation is just around the corner." D. Allen Bromley, presidential science advisor, issued the pledge to a group of presidential scientists attending the *Forum on Supporting Biomedical Research* held at the National Academy of Sciences. Bromley promised the President would be focusing attention on the problem of biomedical funding, and the Bush administration would recommend adequate funding for NIH in the 1992 budget.

The problem of biomedical research funding is not a new one. However, it is one that has been exacerbated by NIH's decision to extend the average duration of an award from 3.3 years in 1982 to 4.3 years in 1990. As a result, the funds available to support new and competing renewal proposals have gradually disappeared even as the NIH budget increased moderately each year. In 1990, it is anticipated that only 4,600 awards will be made because over 50% of the competing awards are being funded for 5 or more years.

Senator Dale Bumpers (D-AR) clearly defined the problem facing the scientific community. Even though NIH has more money, awards more grants, and supports more research than ever before, we *(continued on page 142)*

Physiology in a South African Homeland

Daniel Richardson University of Kentucky College of Medicine Lexington, KY

In previous issues of *The Physiologist*, Heinz Valtin outlined the nature of physiology in Africa (Vol. 30, p. 1), and Harvey Sparks has described his experiences and rewards in teaching (Vol. 30, p. 249) and research (Vol. 31, p. 1) in Zimbabwe. In a later article, Sparks challenged us to lend a helping hand in advancing medical education and research in developing countries (Vol. 32, p. 1).

To promote the helping hand theme, I would like to share some highlights of my involvement with teaching and research in the South African Homeland of Transkei. My experiences are similar to those of Sparks, with an added flavor that attended my performing normal functions of our profession within the abnormal framework of political unrest.

Transkei is an area of approximately 16,000 square miles, located along the Indian Ocean between the cities of Durbin and East London, South Africa. It is the homeland of the Xhosa tribe and has a population of about 4 million, 99% of whom are native Africans. It is predominantly a rural culture in which the majority of Xhosa families live in one room dwellings (rondovels) in and around tribal villages.

The capital of Transkei is Umtata, a relatively modern small city with a variety of commercial establishments and office buildings. It is the seat of government, the hub of business, and the home of the University of Transkei, whose students are primarily, but not exclusively, Xhosa.

The region of Transkei has been the homeland of the Xhosas for hundreds of years, but in 1976 it became an independent self-governing homeland for native Africans of Xhosa origin. Notwithstanding debates over the relationship of this move to apartheid, both Transkei and South Africa consider Transkei an independent nation. Transkei has its own parliament, civil services, police, and military. They are developing their own economic base and establishing educational and health care systems.

In every sense of the word, Transkei is a developing nation, functioning relatively independent of South Africa proper. However, this does not isolate Transkei from the political struggles in South Africa. This was evident from the occasional terrorist activity in and around Umtata and the military presence around strategic installations, government buildings, and, at times, the university.

This situation raises the question: When deciding whether or not to lend a helping hand to a developing country, should we consider the political environment?

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EDITORIAL

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are faced with a paradox that causes us to ask "How can we look so rich and feel so poor?" The resulting anxiety affects investigators and potential investigators at all levels.

Bromley's promise that the administration will strive to reduce the research community's "level of pain" in 1992 is not enough. The Bush administration must couple the increase, no matter how big or small, with a ringing endorsement of biomedical research. An improved climate of funding will enhance the perception of science as a career for students in pre-college and college today.

Salvation, however, cannot be provided by the federal government alone. Industry must also be willing to invest in biomedical research performed at our universities. These institutions serve as the training facilities for the scientists needed by industry to staff their laboratories. The pharmaceutical industry is obligated to increase its support for the training of young people and for university-based basic research. Its past dependence on NIH support of basic science has allowed industry to focus its resources on applied and clinically related drug research.

The issue facing the scientific community is the survival of the research estab-

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Headquarters phone: (301) 530-7164. TELE-FAX: (301) 571-1814. lishment. The problem is how to ensure that NIH is adequately funded next year and in the future. While increasing the awareness of the administration is important, it is also important to increase the awareness of the public. An educated public will help to insure that future funding for NIH is a funding imperative.

The efforts of individual scientists and their scientific societies have already paid dividends for biomedical research. Through letter writing campaigns and personal contacts, the scientific community has contributed to a plan presented by the House Appropriations Committee to significantly increase funding for NIH. The Committee has provided \$8.3 billion in fiscal 1991, an increase of \$1 billion over fiscal 1990 and almost \$700 million over the President's request.

Heeding the call of the American Physiological Society and over 100 other biomedical societies, the House Appropriations Committee presented a plan for funding 6,000 new and competing renewal awards in fiscal 1991. The plan requires NIH to reduce the average grant duration to 4.0 years and eliminate downward negotiation. In addition, NIH was urged to take the total cost of a grant, including indirect costs, into consideration at all stages of the grant review process. The plan presented was designed with "the goal of stability and predictability during a period of planned growth."

The House Appropriations recommendations are only the first step in the budgeting process. The Senate Appropriations Committee must act and disagreements with the House recommendations must be resolved in joint committee. Then, if we are lucky, the Department of Health and Human Services appropriations, including the appropriations for NIH, will be passed by Congress and signed by President Bush. That, however, is a significant "if." Considering the situation in the Persian Gulf and financial crisis facing the United States, it is likely that the hope offered by the House Appropriations Committee will not come to pass in fiscal 1991. Even if it was passed by Congress, it would not survive the Gramm-Rudmann deficit reduction requirements. A more

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SOUTH AFRICAN HOMELAND

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Fundamentally, I think not! Physiologists are trained as scientists and teachers, and few, if any, have the political expertise to render anything more than a personal opinion on something as complex as the politics of South Africa. Our considerations should be practical and basic, such as to improve the health and health education in regions of the world where such assistance is needed and wanted.

My involvement with Transkei medical education began in 1986, when I was invited by the dean of the then new Faculty of Medicine and Health Sciences at the University of Transkei to spend a semester (January through May) assisting in developing a teaching program in physiology and lecturing to the first medical class. Because prior to this invitation I hadn't given much thought to teaching in a developing country, I had no preconceived notions of what the experience was going to be.

In retrospect, this was to be an advantage in helping me to adjust to the consistent inconsistencies that characterize life in a developing nation. My first, and perhaps most useful, advice to anyone contemplating this sort of thing is to be flexible and leave your expectations at home. The help you give will be appreciated and you *will* get a lot accomplished, albeit not necessarily what you had planned.

The first physiology course at Transkei (1986) was taught through a combination of didactic lectures, laboratory exercises, and clinical case presentations. The 12 students were polite and attentive, but seldom asked questions. However, as we got to know each other, interactions became more open.

To a large measure the gradual openness with the students was due to the informal nature of the laboratory and case presentation aspects of the physiology course. For example, most of the laboratory exercises were designed (or redesigned) on the basis of what happened to be available and working at the time the exercise was scheduled. This turned out to be great fun for both students and faculty alike. And with a bit of improvising and flexibility, we were able to perform some fairly sophisticated studies. The piece de resistance was a Langendorff perfused frog heart preparation. (Why frogs? Because this was the only type of laboratory animal available.)

Clinical case presentations offered the best opportunity to interact with the students. To provide clinical expertise, many of the staff physicians at Umtata General Hospital willingly participated in this aspect of the course, despite their Herculean case loads. Once a week we (the physicians and physiologists) presented patients with diseases or disorders, the discussions of which reinforced the physiological principles. However, we never knew from one week to the next exactly which type of patients would be available. Because the class was small, the clinical correlation allowed us on occasion to go into the operating theater, where we literally peeked over the shoulders of the surgeons. The case in this category I remember most was the removal of a calcified pericardium (secondary to TB) that was obstructing the vena cavae. What a way to teach the fundamentals of venous return and Starling's Law of the heart!

The need for flexibility, which I have stressed, was most apparent in adjusting to the aperiodic and often sudden occurrence of class boycotts, which are prevalent in the integrated universities of South Africa, Transkei included. Some were demonstrations of support for the struggle against apartheid; others were related to squabbles between students and university officials. As a result of these disruptions, it was necessary to constantly rewrite and reschedule lectures. In fact, it became almost a jinx to put together a lecture more than a day or two before it was scheduled.

Troublesome though the boycotts were, events such as these elicited some rare examples of determination and courage for getting an education. Not all of the students agreed with the class boycotts, and those who didn't did what they could to carry on with their education under the duress of extreme counter peer pressure. Furthermore, such situations put the students as a whole in the difficult position of deciding whether using the university to oppose the system was of higher priority than using it to get an education.

In addition to being an enriching personal experience, my first visit to the University of Transkei enabled me to markedly improve my skills as a teacher and gain a broader based understanding of physiology. On the latter point, having to present a particular system, eg, neural, within a relatively limited time frame frequented by class disruptions forced me to think seriously about what is really basic to basic physiology. How detailed should a student's knowledge of an action potential be in order to understand neuron function?

My experience with medical research in Transkei was occasioned by a return trip in 1989. Through a variety of curriculum changes that had taken place between visits, most of the basic science faculty now had lighter teaching loads, and as a result they, including myself as a visiting professor, had been charged with increasing research productivity.

For my part, I was able to join up with a Ugandan pediatrician, Dr. Jehu Iputo, who had come to Transkei to investigate the etiology and pathophysiology of Kwashiorkor malnutrition. This disorder occurs in children, primarily males between 1 and 3 years of age. It is related to protein deficiency in the diet, and in the Transkei, it tends to occur in children who are not given adequate protein after being weaned.

One of the salient features of Kwashiorkor is peripheral edema. In consulting with Kwashiorkor experts in South Africa and reviewing the literature, we were surprised to find that no one had investigated filtration mechanics in these patients. Most physicians and investigators apparently hold to the assumption that the edema is secondary to hypoproteinemia in spite of equivocal evidence (Coward and Fiorotto, *Proc. Nutr. Soc.* 38: 51, 1979). Therefore, we formulated an alternative hypothesis that the edema is mediated by a translocation of protein into the interstitium secondary to an increase in capillary permeability. There are many ways to test such a hypothesis, but, as suggested by Sparks, we limited our choices to tests that could be performed with the equipment on hand. This included a homemade strain gauge plethysmograph that had been used by the medical students to measure each others peripheral blood flow. Now there was a different and unexpected use for this equipment, namely to measure capillary filtration rate in Kwashiorkor patients. The reasoning was that if our hypothesis is true, then the capillary filtration rate elicited by a given increase in filtration pressure should be elevated in Kwashiorkor patients.

So we had a hypothesis and a means of testing it. Getting approval to do the study was relatively simple because Dr. Iputo's project had been approved by the Transkei Medical Research Council (the equivalent of an IRB). All that was required of us was to write a description of our proposed protocol and have it approved by the council as an addendum to Dr. Iputo's study.

We then contacted the appropriate medical officers at Umtata General Hospital and a few regional hospitals to obtain their permission to come in and do our studies and recruit staff personnel to assist with the children. Without exception the medical officers and their staffs were willing and eager to lend us a helping hand. Within a few weeks, we were able to measure the capillary filtration rate in response to a standard increment of venous pressure in the forearms of more than 60 children. Some were Kwashiorkor patients; some were suffering from Marasmus, a protein deficiency malnutrition not attended by peripheral edema; while others, eg, orthopedic patients, served as controls.

The results of our study were surprising. In contrast to what was expected, the Kwashiorkor patients had significantly lower, not higher, filtration rates in comparison to the other groups. We have reason to suspect this is due to a reduced number of filtering capillaries secondary to regional ischemia. Plans to test this hypothesis are in preparation.

The entire process of this study, from the time Dr. Iputo and I were introduced until our data were analyzed and presented to a faculty seminar, took less than six weeks. The key elements that contributed to a short-time frame were 1) the experiments were performed as a subproject of an existing ongoing project; 2) we used existing equipment; and 3) the costs were minimal because support help was provided on a volunteer basis from hospital staff.

Judging from this experience and assuming Transkei is not unique as a developing country, there probably are similar short-term research opportunities in other developing countries. These would be ideal as an alternative for a researcher who would like to lend a helping hand, but cannot sequester a full sabbatical year to do so. The only funds needed are the costs of getting and staying there, and the latter are often provided by the host country or university. Perhaps organizations such as APS or IUPS could facilitate the process by matching up physiologists wishing to do research in a developing country with those countries requesting assistance. From a personal point of view, I found this research to be among the most rewarding of my career. The children were a delight, and the interaction was mutually beneficial because they were starved as much for affection as for food.

From a medical aspect, the peripheral edema that attends Kwashiorkor makes these children very uncomfortable and prone to a variety of skin lesions and infections. Resolution of this problem, which we are working on, will be of tremendous benefit to these patients.

In summary, we physiologists spend a considerable portion of our careers hoping that what we investigate will someday be beneficial in making life better. On rare occasions, we leave the lab at the end of the day knowing that what we did was important and will indeed be of benefit. In working with the Transkei children, I had that feeling almost every day. It was truly a rich experience.

Acknowledgments

I would like to acknowledge Drs. Marina Xaba-Mokoena, Minister of Health Republic of Transkei; Dan Ncayiyana, Dean of the Faculty of Medicine and Health Sciences University of Transkei; and Vincent Knight, Chairman, Department of Physiology, University of Transkei, whose support and friendship have been instrumental in the success of my trips to Transkei. A special thanks goes to Dr. and Mrs. Chris McConnachie of the African Medical Mission in Umtata for providing me with a home away from home.

Biomedical Research in Developing Countries

A Special APS-sponsored Poster Discussion at the APS/FASEB 1991 Spring Meeting

In recent years several members of the American Physiological Society have been involved in research and/or teaching projects in developing countries throughout the world. The purposes of this special session are to increase the awareness of the biomedical science community of these activities, to provide a showcase of the type of research conducted in developing countries, and to provide an opportunity for interested FASEB members to learn how they can become involved.

If you have been involved in research and/or teaching in a developing country, you are invited to present a poster of your activities at this special session which will be held on Tuesday, April 23, 1991 4:45-6:45 p.m. in Atlanta, Georgia. Interested individuals should obtain the FASEB Call for Papers and submit an abstract by the deadline of December 3, 1990.

Preview APS/FASEB 1991 Spring Meeting Symposia Atlanta, Georgia April 21-25, 1991

The Regulation of Glucose Transport in Skeletal Muscle

Chair: R. J. Barnard. Participants: E. S. Horton, J. L., Ivy, J. O. Holloszy, W. T. Garvey, A. Klip, and R. J. Barnard.

Euglycemic insulin clamp studies have indicated that 70-75% of the glucose is removed by skeletal muscle. Clamp studies have also shown that the major site of insulin resistance in noninsulin-dependent diabetes mellitus is skeletal muscle and some post-binding defect is responsible for the insulin resistance. Obesity and aging are other factors associated with the development of insulin resistance. Much of the work on glucose transport has been done on fat cells; however, recent attention has focused on skeletal muscle because of its importance in insulin resistance. The purpose of this symposium is to discuss the pros and cons of the various techniques used to study glucose transport in skeletal muscle, including L6 cells, isolated sarcolemmal membrane and other subcellular components, hindlimb perfusion, whole muscle incubation, and the use of antibodies. In addition, presentations will focus on the mechanism of insulin action, the effects of exercise and obesity, and the effects of diabetes on the glucose transport system in skeletal muscle.

Mechanisms Involved in the Coupling of Excitation to Sarcoplasmic Reticulum Ca²⁺ Release in the Heart

Chair: E. G. Lakatta. Participants: E. G. Lakatta, A. Fabiato, G. Meissner, M. Morad, M. Cannel, W. G. Wier, and M. D. Stern.

Recent advances in methods to measure membrane currents, and cytosolic calcium transients in single cardiac cells, sarcoplasmic reticulum calcium release in cell fragments, current created by sarcoplasmic reticulum Ca²⁺ release in reconstituted SR, and identification of molecular structure of sarcolemmal Ca²⁺ and SR calcium channels have generated a substantial amount of data relating to mechanisms that couple sarcolemmal depolarization to sarcoplasmic reticulum Ca²⁺ release in the heart. This symposium discusses the changes and weakness of the various experimental approaches and will attempt to synthesize data gathered in different experimental preparations to determine areas of weakness and conflict regarding E-C coupling membranes and to identify specific areas of deficiency that require further study to permit quantitative modeling. While several present models of excitation-contraction coupling can account for the general features of the twitch, they usually require assumption beyond those which can be verified experimentally. In particular, most models of calcium-induced calcium release are easily regenerative. In order to model the high degree of refractoriness to oscillation and propagation normally observed, various contrivances, explicit and implicit, have been employed to isolate the sensing of calcium from the release of calcium; the anatomical basis of such devices, or even their logical consistency, has not been demonstrated. The principles and constraints of such modeling will be discussed. The intended audience will thus be offered an opportunity to tune into major issues, accomplishments and future research goals that need to be met to extend the frontier of research in this field.



(Sponsored by the Grass Foundation)

Avian Foregut Function

Chair: G. E. Duke. Participants: G. E. Duke, S. B. Chaplin, A. R. Place, A. Grajal, D. Levey, L. Glass, E. Temles, W. Karasov, and C. Martinez del Rio.

Because birds inhabit many diverse dietary niches, they have evolved a variety of morphological and physiological adaptations for digestion. Presentations in this symposium will describe both a basic overview of the morphology and physiology of the foregut as well as anatomic and functional variations in species specialized for feeding on krill, foliage, fruits, nectar, and small rodents. This symposium will offer: I) a rare opportunity to examine both animal diversity and an integrated systems approach to the study of digestive physiology; 2) a forum for interaction between researchers with a common interest in avian digestion using biochemical, ecological, and physiological research approaches; and 3) a chance to set goals and establish collaborations.

Tutorial

Single Ion Channels and Patch Clamp Methods

Chair: D. C. Eaton and J. T. Herlihy. Participants: D. C. Eaton, R. Horn, R. J. French, and J. T. Herlihy

This tutorial was designed to introduce the general membership to emerging electrophysiological and biophysical techniques designed for studying single ion channels. Single channel recording at present provides the only way of monitoring, in real time, conformational changes of a single protein molecule and their modulation by such factors as transmembrane voltage, agonists, and second messengers. Eaton will trace the historical development of these techniques and compare the various methodologies. Horn will follow with a more detailed and practical description of patch- and perforated patch-clamp recording techniques. Finally, French will discuss the techniques involved in the insertion of ion channels in artificial membranes. Hopefully, the tutorial will encourage scientists who are not expert in these modern techniques, but who perceive a need for them in their own areas, to learn the techniques and install them in their own laboratories.

Interactions Between Energy Metabolism and Cardiovascular Regulation in Exercise

Chair: S. F. Lewis. Participants: J. H. Mitchell, J. T. Shepherd, H. V. Sparks, Jr., M. P. Kaufman, R. G. Victor, M. J. Kjaer, and S. F. Lewis.

Precisely how many physiological responses to exercise are closely linked with metabolic demands to active muscle are poorly defined. This symposium is designed to integrate and summarize our current knowledge of the mechanisms that link cardiovascular regulation and regulation of mobilization and delivery of extra-muscular blood-borne substrates with muscle energy metabolism during exercise. One or more muscle metabolites or a critical local muscle metabolic state reflecting the balance between muscle energy supply and demand participate(s) both in local vasodilatation and in activation of metabolically sensitive afferent nerve endings that project from muscle to medullary centers regulating systemic cardiovascular and neuroendocrine adjustments to exercise. The major specific issues this symposium addresses is identification of the metabolite or metabolic state of active muscle participating in the circulatory and neuroendocrine mechanisms controlling oxygen delivery and substrate mobilization and delivery. This symposium represents a novel attempt to synthesize perspectives of investigators using various models and approaches to study different aspects of this complex problem. Local muscle vasodilation, control of the systemic circulation and neuroendocrine regulation of substrate mobilization typically are subjects dealt with in distinctly different symposia. The underlying theme of the present symposium is that these systems are regulated in an integrated fashion largely in response to the balance between muscle energy supply and demand. Critical questions to be addressed include: Are the same or different muscle metabolites or metabolic states involved in eliciting the systemic circulatory responses, local muscle vasodilatation, and substrate mobilization during exercise; is substrate mobilization/delivery as precisely regulated as oxygen delivery; and is there really an "exercise pressor reflex"? The symposium should be of interest to workers in cardiovascular and neuroendocrine physiology and muscle metabolism and should provide attendees with many new possibilities for future research questions.

Pathophysiology of Hypertension in Blacks

Chair: J. C. S. Fray and J. G. Douglas. Participants: J. G. Douglas, B. Faulkner, J. Mufunda, N. B. Anderson, R. S. Cooper, and J. C. S. Fray.

The primary objective of this project is to compile a rigorously critical scientific document of Hypertension in Blacks. The book would bring together the wealth of knowledge that has now accumulated over the past few decades about the prevalence, mortality and morbidity, and rational therapies for this the chief killer of black people. Experts will be invited to provide chapters on his/her field of interest, as it bears directly on the problem. The book would present an in depth analysis of I) hypertension in general and for blacks in particular; 2) the role of calcium in the development and reversal of the disease; 3) the role of stress and active coping in both the young and aged; 4) the epidemiology of the disease, including the excellent new work on genetic predisposition; 5) the hormones involved; and 6) some rational therapies for prevention and cure. It promises to be a state-of-the-art presentation of the soundest scientific information, presented by experts in the field. The overall objectives are to inform practitioners in the field of the state of the present knowledge in terms of basic research and clinical findings; to educate the populations affected by providing a resource of accessible information; to point to the similarities and differences between hypertension in blacks compared to other races; to provide a foundation for the scientific direction of future research; to focus on the implications of hypertension in blacks from both social and economical perspectives; and to assist policy makers on the extent and boundaries of the "number one killer of blacks."

Interactions of Anion and Cation Transport in Cell Volume and pH Regulation

Chair: P. A. Knauf and S. Grinstein. Participants: S. Grinstein, D. Restrepo, M. L. Jennings, W. F. Boron, F. Sachs, K. Foskett, and P. A. Knauf.

This symposium addresses the question of how anion, cation, and anion-cation cotransport processes act coordinately to maintain cell volume and pH constant. Experiments in various cells and tissues have revealed a number of different transport processes that are involved in these regulatory phenomena. Some controversy exists as to which of these processes are important in a particular cell type and which characteristics of the systems are essential for regulation. More recently, some of these processes have been characterized both structurally and kinetically, and some possible mechanisms involved in turning these transport systems on or off have been proposed. The symposium offers the audience several viewpoints on this fast-moving field from experts whose work has focused on one or more of these regulatory transport systems, and in particular will foster discussion of how the various transport systems are interrelated. It also addresses the larger issue of how these phenomena may be involved in the regulation of other processes, for example, epithelial function, and will deal with future trends in the analvsis of the various transport systems, as well as the very difficult and important question of how changes in volume or pH are sensed by the regulatory transport systems.

Endocrine Adaptation to Hypoxia

Chair: H. Raff and M. F. Dallman. Participants: J. Claybaugh, A. Baertschi, H. Raff, C. E. Wood, M. Breslow, and M. F. Dallman.

Hypoxia is a common sequela of cardiovascular and pulmonary disease and often leads to a variety of systemic consequences including disturbances in water and electrolyte metabolism, further deterioration of cardiac and pulmonary function, as well as diminished mentation and sensation. The endocrine adaptation to hypoxia has been of interest for many years, although it has never been addressed in an organized way such as a FASEB and/or APS symposium. The symposium will bring together experts in various fields interested in the control of hormone secretion in hypoxic states. Particular attention will be payed to the hormones involved in water and electrolyte homeostasis (vasopressin, aldosterone, atrial natriuretic peptide).

Lactate Kinetics: Physiological and Methodological Issues

Chair: R. R. Wolfe. Participants: R. R. Wolfe, C. Cobelli, D. Wasserman, K. Wasserman, and G. Brooks.

The production of lactate is a fundamental metabolic process of great interest in a variety of physiological and pathological circumstances, including critical illness, hypoxia, and diabetes. The response in exercise is particularly important, both because of the importance of lactate kinetics in relation to exercise tolerance, and more generally because the nature of exercise testing provides a dynamic test of the control mechanisms involved. Despite the metabolic importance of lactate metabolism, considerable information has been generated, but controversy still exists owing to questions regarding methodological issues. Consequently, the focus of this session will be two-fold. There will be three speakers dealing primarily with different perspectives of the physiological control of lactate kinetics, and two speakers focused more on methodological issues. The methodological points are new. Because speakers will present current work only recently accepted for publication and not yet in press.

Molecular Biology of the Myocardial Growth and Development

Chair: K. R. Chien and S. Chien. Participants: To be announced.

Recent advances in molecular biology have provided new approaches to probe the structural and functional bases of physiological events at the molecular level. Such applications have been particularly notable in some areas, the neuromuscular and endocrine systems. In the last few years, however, significant advances have also been made in the use of molecular biology to elucidate the structure and function of the cardiovascular system. The aim of this symposium is to summarize the recent advances in research on the molecular biology of myocardial growth and development. The papers to be presented in this symposium will link the knowledge learned from molecular studies to functions of the myocardium at cellular and organ levels.

The program promises to bring the audience up-to-date with the newest developments in the molecular mechanisms of myocardial growth and development, including myocardial hypertrophy. The results of the symposium will stimulate new research on the molecular aspects of myocardial physiology and pathophysiology.

CALL FOR PAPERS

Have you received your *Call for Papers?* Deadline for receipt of abstracts is *December 5, 1990.* Contact FASEB Meeting Office, 9650 Rockville Pike, Bethesda, Maryland 20814. Phone: (301) 530-7010.

Membrane Transport of Cations in Vertebrate Red Blood Cells: The Lessons of Diversity

Chair: T. J. McManus. Participants: T. J. McManus, P. M. Cala, R. Motais, J. S. Willis, J. C. Parker, M. Milanick, and P. B. Dunham.

Red cells from diverse vertebrates provide a virtual "catalog" of cells specialized in different specific transport mechanisms: volume-activated Na-proton exchange in dog red cells, volumeactivated K-Cl cotransport in LK sheep cells, Na-K-Cl cotransport in ferret cells, ligand-activated carriers in avian and lower vertebrate red cells also provides cases of exceptional combinations of mechanisms that offer the possibility of insight into the regulation of ion balance and cell volume in the whole cell in isolation and in the intact organism, eg, high Na-low K cells, cells with adaptations to extremes (temperature, oxygen, substrates). This broader view of red cells, other than the ever popular human erythrocyte, as models of ion transport has not received the attention it deserves.

Each speaker will briefly summarize the contributions of the special red cells he represents and will then focus on a transport mechanism of his particular interest.

Calcium and the Heart

Chair: G. A. Langer. Participants: W. Giles, K. D. Philipson, E. Carafoli, A. Fabiato, R. J. Solaro, and G. A. Langer.

Developments, over the past decade, have been remarkable in terms of quantity and in terms of new insights into the complexities of calcium's role in cardiac function. It has been difficult for one to remain current in all aspects of the subject. The mission of the symposium is to present individual summaries to the role played by a number of subcellular organelles in the regulation of myocardial cellular calcium with a final overview of cellular contractile control.

Is Growth Hormone a Growth Factor?

Chair: J. Schwartz. Participants: F. Talamantes, C. Carter-Su, R. Corin, C. Dani, O. Isaksson, and J. Schwartz.

The aim of the symposium is to present some of the most recent work on growth hormone (GH) action that addresses whether GH acts through mechanisms typically attributed to well-studied growth factors. The symposium will include presentations by C. Carter-Su on tyrosine kinase activity associated with GH receptors and by F. Talamantes, who has cloned the mouse GH receptor and is studying its biological importance. A section on differentiation-promoting actions of GH will include a talk by C. Dani, who has identified differentiation-dependent genes inducible by GH in cultured adipocytes. His work spans several issues in growth factor action, because he has also examined the involvement of protein kinase C in GH induction of the c-fos protooncogene, and induction of the gene for insulin-like growth factor I(IGF-I) by GH. R. Corin will talk about the role of GH in promoting differentiation. Finally, O. Isaksson will discuss independent and related actions of GH and IGF-I, a proposed mediator. By presenting work from this spectrum of investigators, this symposium will present a new perspective on GH that is timely and supported by some of the most exciting new work in the field. It should be of interest not only to investigators in the area of GH, but to those working on growth factors, peptide hormone receptors, and regulation of differentiation and gene expression.

Mechanisms of Ammonium Transport

Chair: L. L. Hamm and D. W. Good. Participants: L. L. Hamm, G. T. Nagami, E. E. Simon, D. W. Good, M. A. Knepper, S. C. Hebert, and I. Kurtz

Classically renal ammonium excretion was attributed to free diffusion of NH₃ and "trapping" of ionic NH₄⁺ in acidic compartments. Recent studies have dramatically altered this simple scheme. NH4⁺ is transported on a variety of membrane transport proteins, and the magnitude of NH₃ diffusion across some membranes is limited. This symposium will explore ammonium transport (NH₃ and NH₄⁺) across cell membranes and across various nephron segments. The discussants have approached this important area with a variety of recently developed techniques, both in vitro and in vivo. Nephron segments with unique characteristics will be discussed to illustrate both the mechanisms of ammonia transport across cell membranes and the physiologic regulation of epithelial ammonia transport for each nephron segment. Some discussants will integrate the various nephron segments into a whole organ model of ammonia transport. Other discussants will delve into the molecular mechanisms and regulation of NH4⁺ and NH3 transport. In addition, ammonia has recently been shown to have a variety of unanticipated cellular effects, such as stimulating renal cell growth. The symposium will incorporate discussion of this new direction. In sum, the symposium will provide the basis for understanding the mechanisms of epithelial ammonium transport and provide an up-todate review of the processes involved in renal ammonium excretion.

Application of Molecular Biology to the Study of Vascular Endothelium

Chair: S. Chien and M. A. Gimbrone, Jr. Participants: M. A. Gimbrone Jr., P. Libby, T. Collins, J. N. Wilcox, T. A. Springer, D. Hanahan, and S. Chien.

There have been rapid advances in vascular biology, which is a field that requires interdisciplinary investigations involving molecular biology, cell biology, vascular physiology, and pathophysiology. The aim of this symposium is to prevent the state-of-the art research activities in selected areas of these active fields, with a focus on the application of molecular biology to the study of physiology and pathophysiology of the vascular endothelium.

The molecular biology of several proteins involved in vascular biology will be discussed, including cytokines, growth factors, adhesion m molecules and angiogenic factors. The physiological processes to be covered include leukocyte-endothelial adhesion, vessel wall hypertrophy, inflammatory responses, and angiogenesis. The relevant disease processes will include atherosclerosis, inflammation, and peripheral vascular disease. The presentations will also focus on several new molecular approaches that can be employed to tackle physiological and pathophysiological problems, such as in situ hybridization, expression cloning, and transgenic mice.

Segmental Epithelial Electrolyte Transport in Pulmonary System with Relevance to Cystic Fibrosis

Chair: C. M. Liedtke. Participants: D. Nelson, A. Guggino, C. M. Liedtke, M. Van Scott, E. Crandall, and G. Cott.

Fluid absorption and secretion in the respiratory tract appears to be tightly regulated by airway epithelial cells. Abnormal regulatory responses are seen in cystic fibrosis, a genetic disease characterized by the failure of hormones and mediators to activate apical Cl channels and thus stimulate Cl secretion. The involvement of other electrolyte transport processes and of pulmonary segments other than large (tracheal) airways in the ion transport defect of CF is still not clear. In this symposium, electrolyte transport properties of pulmonary segments from trachea to alveoli will be explored. Characteristics of electrolyte transporters and their regulation will be compared to that in large airways. To augment these discussions, developmental changes in transport properties, particularly in alveoli, will also be presented. These discussions will lead to more comprehensive models of airway epithelial electrolyte transport.

The Heart and Control of Renal Excretion: Neural and Endocrine Mechanisms

Chair: T. V. Peterson and B. A. Benjamin. Participants: I. H. Zucker, K. G. Cornish, T. V. Peterson, J. R. Dietz, B. A. Benjamin, and J. C. Burnett, Jr.

The purpose of this symposium is to address the state of current knowledge concerning the role of the heart as an important regulator of renal fluid and electrolyte excretion. This cardiac-renal axis involves two types of control mechanisms: I) neural reflex regulation via cardiac mechanosensitive nerve receptors utilizing a number of effector mechanisms and 2) the newer concept of endocrine regulation via cardiac natriuretic hormones, an area first investigated approximately a decade ago. Despite a great deal of work having been done in both of these areas, the importance of these mechanisms as a major controller of renal function is still controversial. This symposium will summarize pivotal research in this area (past and present) and will do so from a unique viewpoint. As opposed to previous sessions on the broad topic of neurohumoral control of the circulation or sessions devoted specifically to atrial natriuretic peptides, this symposium's focus will be on the possible importance of the heart as a blood volume sensor and how it utilizes these two means, one neural and one humoral, to play a role in maintaining body fluid homeostasis. Equal time will be devoted to each of these mechanisms. This approach should thus be broad

enough to appeal not only to investigators in the area of water and electrolyte homeostasis but also those whose interests lie in neural control of the circulation, overall cardiovascular and renal physiology and endocrinology. On the other hand, the topic will be specific enough to allow the presentations to all tie together and have the blood volume sensing function of the heart as a common focus. In order to give a contemporary perspective the presenters consist of scientists who are presently very active in the particular research area on which they will be speaking. In addition, the participants have all been asked to not only cover their topic but also identify areas of controversy and future research directions that need to be pursued.

The Regulation of Extracellular Matrix Formation During Lung Development and Repair

Chair: S. E. McGowan. Participants: S. E. McGowan, R. H. Goldstein, R. P. Mecham, M. Bernfield, and J. A. McDonald.

Alterations in the formation and degradation of extracellular matrix proteins are thought to play a pivotal role in the pathogenesis of inflammatory lung diseases such as emphysema and interstitial fibrosis. However, the mechanisms regulating the synthesis and deposition of these important structural elements during lung growth and repair are only beginning to be elucidated. Recently, important advances have been made in our understanding of the structure and expression of several genes including those coding for collagen, elastin, fibronectin, and various proteoglycan core proteins. Current evidence suggests that resident cells in the interstitium, as well as inflammatory cells traversing the lung, may release soluble mediators that influence gene expression. Molecular contacts between extracellular proteins and the cells responsible for their production also appear to influence the production of extracellular matrix. This symposium will summarize recent advances in this field, focusing on the processes that may regulate the synthesis and deposition of collagen, elastin and proteoglycans, and the various cellular receptors for extracellular matrix macromolecules. This discussion should be of interest to investigators studying the cell biology and biochemistry of connective tissue in the lung and other expansile organs such as the major arteries.

Cellular and Molecular Aspects of Muscle Disease

Chair: K. P. Campbell. Participants: To be announced.

Remarkable progress has been made in the last few years of study of molecular defects in several skeletal muscle diseases. We are particularly emphasizing three skeletal muscle diseases that have been extensively studied in the last few years: *I*) muscular dysgenesis, a skeletal muscle disease where excitationcontraction coupling is completely absent; *2*) malignant hyperthermia, which appears to result from a defect in the ryanodine receptor/calcium release channel and; *3*) Duchenne muscular dystrophy, which results from the absence of the membrane cytoskeletal protein dystrophin.

Renal Ion Channels: Molecular Biology and Signal Transduction Pathways

Chair: B. A. Stanton and D. Eaton. Participants: B. A. Stanton, B. C. Rossier, D. Benos, D. Eaton, and G. Giebisch.

Ion channels mediate numerous events in epithelial cells including vectorial salt transport, volume regulation, and maintenance of intracellular ionic composition. Several aspects of the molecular biology and the signal transduction pathways regulating Na⁺, K⁺, and Cl⁻ channels will be described by a panel of experts in this field. This symposium will cover recent advances on the molecular biology and signal transduction pathways of renal epithelial ion channels with an emphasis on integrating observations at the molecular level with our current understanding of renal function. Stanton will present an overview of sodium-conduction channels and their regulation by protein kinases and G proteins. Rossier will describe the molecular biology of Na⁺ channels. Benos will discuss the subunit structure function of sodium channels. Eaton will describe the regulation by insulin of Cl⁻ channels, and Giebisch will review the regulation of K⁺ channels by ATP and protein kinase A. It is anticipated that this symposium will have a broad appeal to investigators interested in ion channels, signal transduction molecular biology, endocrinology, and renal and epithelial ion transport.

Advances in Integrative Human Neurocirculatory Physiology

Chair: A. L. Mark. Participants: To be announced.

In recent years, attention has been focused on the momentous strides in cellular and molecular biology, but during these years there have also been dramatic advances in technology for increasingly sophisticated study of sympathetic neural mechanisms in physiologic and pathophysiologic states in humans. This symposium is intended to highlight the increasing power of integrative cardiovascular neurophysiology in humans. The first three presentations will deal with a critical analysis of new methods of sympathetic function in humans. The last four presentations will deal with the changing concepts and increasing insight regarding mechanisms of neural control of the circulation in physiologic and pathophysiologic states. This symposium should emphasize the continuing vitality of integrative physiology in humans.

Tissue Remodeling by Inflammatory Cells

Chair: R. M. Senior. Participants: R. M. Senior, H. G. Welgus, M. J. Banda, T. J. Ley, J. Travis, and S. L. C. Woo.

Inflammatory cells can degrade extracellular matrix and thereby change tissue architecture. Degradation of extracellular matrix by inflammatory cells appears to be involved in pathologic conditions like pulmonary emphysema and rheumatoid arthritis. It is also an important feature of physiologic responses requiring tissue remodeling such as wound repair. Release of proteolytic enzymes is the means by which inflammatory cells produce their degradative effects on matrix. In recent years, there has been a rapid expansion of information about matrixdegrading enzymes released by inflammatory cells. These new data pertain to regulation of production at the molecular level, structural features of the enzymes and their mechanisms of action, and inhibitors of these enzymes. This symposium will provide an update on the biochemical and molecular aspects of collagenases, elastases, and other matrix-degrading enzymes and inhibitors of these enzymes. The topics to be presented should be of interest to a wide range of biomedical scientists.

Comparative Biology of Adhesion

Chair: H. Waite. Participants: To be announced.

Living organisms are exquisitely assembled and interdependent populations of cells and molecules that rely on adhesive interactions for their integrity and function. The obviousness of this statement belies the very complex and dynamic character of adhesive interactions in living organisms. To some extent, this complexity is being addressed by the ongoing research programs and frequent conferences having to do with fibronectin, an extra- and intercellular adhesive protein. While no symposium can hope to do justice to the infinite variety of adhesive interactions in nature, much stands to be gained from the discussion of other types of bioadhesion. The proposed session on bioadhesives addresses four major areas of comparative bioadhesive research: I) environmental and physical factors shaping bioadhesion, 2) some case studies of bioadhesion at the organismic level, 3) structure-function relationships of bioadhesive molecules, and 4) the regulation and expression of bioadhesives. The focus is necessarily broad and interdisciplinary involving ecology, biomechanics, botany, biochemistry, molecular biology, and zoology. However, all the participants have an abiding interest in understanding how bioadhesion works and how it is modulated.

Molecular Endocrinology of Gastrointestinal Hormones

Chair: J. A. Williams and T. Yamada. Participants: R. Goodman, S. Brand, T. Yamada, T. Schwartz, and J. Williams.

Gastrointestinal hormones are being increasingly recognized as key regulators of gastrointestinal function, as well as being present in the brain and peripheral nervous system. Recently, new techniques, primarily molecular biological, are providing important new information regarding these regulators and their actions. Molecular cloning of the peptide regulators has led to an understanding of their genetic regulation and posttranslational processing. In the case of action of the hormones, receptors are beginning to be cloned and their intracellular messengers elucidated. Rather than focus on particular hormones, the speakers will outline advances in their own system that are generally important to all GI hormones and regulators. A recurring theme will be levels and mechanisms of regulation in these integrative systems. The investigational and potential therapeutic role of new peptiderigic and peptide mimetic antagonists will also be considered.

Flow Dependent Regulation of Vascular Tone

Chair: J. A. Bevan and G. Kaley. Participants: P. F. Davies, J. A. Bevan, G. M. Rubanyi, P. C. Johnson, G. Kalsey, and U. Pohl.

There are numerous local control mechanisms that regulate resistance to blood flow. It has been known for some time that large conduit arteries dilate to increases in blood flow but whether a "flow-sensitive" mechanism that is independent of parenchymal tissue metabolism is present in vascular networks and whether it has a regulatory role has not yet been firmly established.

The purpose of this symposium is to explore the following questions: I) Are changes in flow (shear stress) a signal for blood vessels to change their tone. 2) At what level(s) of the vascular tree are flow-dependent responses present? 3) What is the nature of the stimulus response coupling in endothelial and/or vascular smooth muscle cells? 4) What are the mediators of the vascular response (EDRF, prostaglandins, ionic changes, intracellular messengers)? 5) Is there a role for flow-sensitive responses in overall cardiovascular regulation?

Modern History of the Nervous System

Chair: L. H. Marshall and D. L. Gilbert. Participants: D. P. Purpura, D. B. Tower, B. Grafstein, E. M. Shooter, R. F. Thompson, L. H. Marshall, and D. L. Gilbert.

The symposium is structured around five themes that can be construed in the nature of universals or commonalities of the physiology of nervous system function: electrical activity, neurochemical interactions, movement of materials within nerve cells, neuronal trophic factors, and adaptive behavior. The scope will be from the 18th to the mid-20th centuries. The speakers are senior scientists whose initial training was in five different disciplines. With those various backgrounds, the speakers are knowledgeable about the role of novel techniques in the promotion of discoveries and new approaches to solving problems in their fields. The resulting interactions highlight the confluence of objectives and principles that has been conducive to recent progress in elucidating brain function.

Molecular Aspects of Renal Phosphate Transport

Chair: S. A. Kempson. Participants: T. Dousa, H. Murer, R. Beliveau, M. Levi, K. Hruska, and S. Kempson.

The sodium-dependent phosphate transport system (Na/Pi cotransporter) in the brush border membrane of the renal proximal tubule is closely regulated by several hormones and metabolic stimuli. The identity of the cotransporter protein(s) and the molecular mechanisms of regulation have remained elusive. These issues will be addressed in this symposium.

The first group of speakers will summarize new information about the molecular properties and biogenesis of the Na/Pi cotransporter. Data using different experimental techniques will



W. Steve Ammons Associate Professor of Physiology Jefferson Medical College Philadelphia, Pennsylvania

be compared. The techniques include new phosphonate probes, molecular genetics, reconstitution and kinetic studies, and radiation-inactivation analysis.

The second group of speakers will summarize current concepts of the intracellular regulation of Na/Pi cotransport, with the emphasis on molecular mechanisms. The roles of lipid fluidity, second messengers, and endocytic internalization will be discussed.

The symposium is focused on the kidney, but experimental strategies will appeal to a wide audience, especially those interested in membrane transport and the physiology of epithelial cells.

BMES Symposium Molecular Aspects of Cell Adhesion

Chair: L. V. McIntire. Participants: To be announded.

There have been rapid developments in our knowledge of the cell and molecular biology of adhesive receptors. Coupled with this have been exciting recent results from mathematical models of receptor mediated adhesive interactions. This symposium will bring together new aspects of both experimental and theoretical modeling of cell/cell adhesion—with emphasis on understanding the effects of fluid motion and substrate (receptor density and type) on adhesion mechanisms at the molecular level.

SEBM Symposium The Role of Endogenous Factors in Tumor Promotion

Chair: H. C. Pitot. Participants: H. C. Pitot, J. D. Yager, G. Michalopoulos, G. Witz, B. Butterworth, and J. Klaunig.

The stage of tumor promotion has now been well characterized in several models of multi-stage carcinogenesis, and there is substantial evidence that tumor promotion is of critical importance in the development of most human cancers resulting from environmental factors. However, the mammalian organism possesses within its internal environment many known tumor promoting agents. In addition, normal metabolism, development, and cell interaction may, under some circumstances, function to enhance or act as promoting agents. This symposium will address the role of several endogenous promoting agents and processes related to tumor promotion as factors in the genesis of both spontaneous and induced cancers. A number of hormones, including growth factors that normally occur in the organism, may under a variety of circumstances exert their promoting action during the development of specific neoplasms. An important byproduct of normal metabolic reactions is the active oxygen radical that may play a critical role in tumor development. Further, cell-to-cell interaction, especially through gap junction communication, is a process that is altered by many promoting agents, both exogenous and endogenous. Finally, the process of tumor promotion is dependent on the expansion by cellular replication of clones of initiated cells. Thus, the regulation of cell division by both endogenous and exogenous factors will be critical to the ultimate regulation of cell division by both endogenous and exogenous factors critical to the ultimate development of malignant neoplasia, which is the potential sequela of the stage of tumor promotion.

BMES Symposium

Shear Stress Effects on Vascular Endothelial Cells

Chair: R. M. Nerem and L. V. McIntire. Participants: P. F. Davies, P. R. Girard, C. F. Dewey, Jr., E. A. Sprague, B. C. Berk, S. L. Diamond, J. A. Frangos, R. M. Nerem, and L. V. McIntire.

In vivo the vascular endothelial cell resides in an environment of flowing blood. The endothelium is the inner lining of a blood vessel, and if there is an effect of hemodynamics on vascular wall biology, one mediator of any such effect would be the vascular endothelial cell. In order to study the influence of hemodynamic forces on the structure and function of endothelial cells, a number of research laboratories have turned to cell culture. Over the past 5-10 years, studies have indicated important effects of shear stress on endothelial biology. These efforts have been very much of an interdisciplinary nature, and the purpose of this symposium is to update the audience on recent progress in the investigations. Of particular interest will be recent studies on the mechanisms involved in the recognition and transduction of fluid mechanic, shear stress signal, and the extent of any shear stress effects at the molecular biology level.

INTERACTIONS OF THE ENDOCRINE AND CARDIOVASCULAR SYSTEMS IN HEALTH AND DISEASE 1991 MEETING SYMPOSIA OUTLINE -- SEPT 29-OCT 3, SAN ANTONIO, TEXAS

 MONDAY, SEPTEMBER 30 	TUESDAY, OCTOBER 1	WEDNESDAY, OCTOBER 2	THURSDAY, OCTOBER 3
SYMPOSIUM 8:30-11:30 AM Hormone transport in blood: emerging concepts	SYMPOSIUM 8:30-11:30 AM Neurotransmitter release in brain nuclei controlling CV and pituitary function	SYMPOSIUM 8:30-11:30 AM Atrial natriuretic factor and cardiovascular regulation	SYMPOSIUM 8:30-11:30 AM Calciotropic hormones and cardiovascular function
Mechanisms of endocrine hypertension 12:00 Noon-1:00 PM	SYMPOSIUM 8:30-11:30 AM Vascular specialization in endocrine organs	SYMPOSIUM 8:30-11:30 AM Identification and treatment of cardiovascular disease in diabetes	Hormonal signal transduction and regulation of vascular smooth muscle
MEET THE PROFESSOR	12:00 Noon-1:00 PM MEET THE PROFESSOR	12:00 Noon-1:00 PM MEET THE PROFESSOR	12:00 Noon-1:00 PM MEET THE PROFESSOR
Thyroid hormone and cardiac function	SYMPOSIUM 2:30-5:30 PM Neuropeptides in blood flow regulation	LECTURE 1:30-2:30 PM Cardiovascular and	SYMPOSIUM 2:30-5:30 PM Neurohumoral mechanisms in bulbospinal control of
POSTERS	SYMPOSIUM 2:30-5:30 PM Regulation of angiogenesis	SOCIETY DINNER AND LECTURE	SYMPOSIUM 2:30-5:30 PM
	TUTORIAL 7:00-9:00 PM Second messenger systems in vascular smooth muscle	Issues in animal experimentation	insulin resistance and hypertension
	TUTORIAL 7:00-9:00 PM Methods of hormone measurement	2:50-4:30 PM POSTERS	POSTERS
	1:00-3:00 PM POSTERS	- } _	



News from Senior Physiologists

Letters to Roy O. Greep

Retirement has provided a chance to increase the range of scientific interests through publications like *Scientific American*, but I have not really been active in scientific research, writes **Tom Noonan**. He reported that a college classmate has said that we were in the "creaky, cranky golden years," and he added that that is not a bad description of the situation.

Letters to John R. Brobeck

Novera Herbert Spector said "I retired many years ago, in 1962, when I entered your department as a graduate student. I am still enjoying my retirement occupation as a physiologist." He also said he still enjoys fencing and manages to compete in world class competition and do well, mostly in sabre. Until January 1989, he was active as president of the International Society for Neuroimmunomodulation.

"Retirement gave me one of the most pleasant experiences in my life. I do not have to deal with the 'peerview' struggle for research funds, etc. anymore," writes **Frederick F. Kao.** 'Confucius say, "People like to judge people. Not being judged is a blessing." '

Kao said he has retired, but not stopped working because he believes the life of a physiologist never has cadence. He left SUNY-Downstate Medical Center last August, moving to the Institute for Advanced Research in Asian Science and Medicine at Hofstra University, which is about four miles from his home. He also continues to publish the *American Journal of Chinese Medicine*, which he founded.

Cardiovascular Section Annual Report

Section Committee Membership 1990-91

Allyn L. Mark will be the new Section Chairman and Richard J. Traystman will be the new Treasurer. James W. Covell was elected the new Secretary. Kim P. Gallagher was elected to a three-year term on the Nominating Committee (1993). The other members of the Nominating Committee are James B. Bassingthwaighte (1991) (Chairman), and James M. Downey (1992). Harris J. Granger and Erik Ritman will continue to serve on the Program Advisory Committee (both appointments end 1992).

Section Memberhsip

The Cardiovascular Section is open to any APS member. The current primary regular membership of the Cardiovascular Section is 916, which is 22.5% of all primary regular members of APS.

Fellows are those members of the Cardiovascular Section who have made contributions to our understanding of cardiovascular physiology. There were 264 fellows in 1989 and 16 new fellows were elected this year, for a total of 280 current fellows. Nominations for new fellows must be made by at least two existing fellows, with supporting letters sent to the Steering Committee Secretary. The nominations are then voted on by the Steering Committee. In 1990, the following members were elected to fellowship: John Flaherty, Lowell Maughan, Mark Chapleau, Kathryn Lamping, Frank Faraci, Michael J. Davis, Clive Greenway, Carl Jones, Douglas Jones, Andrew Somlyo, Avril Somlyo, David Busija, Charles Leffer, Thomas Peterson, Stephen Goldman, and Julien Hoffman.

Awards

The Cardiovascular Section presents two awards. The Lamport Award is presented to an outstanding young investigator less than 36 years of age who has made contributions to cardiovascular physiology. The Lamport Awardee is selected by the Wigger's Awardee of the previous year. Eric Feigl selected **Bruce Robert Ito**, Assistant Research Physiologist, University of California, San Diego as the 1990 Lamport Awardee. At the Cardiovascular Section Dinner, Ito was presented with a certificate and a check for \$200 from the Cardiovascular Section as the Lamport Awardee.

The Carl J. Wiggers Award is presented in honor of the founder of the Section. Each year at the Cardiovascular Section Dinner, the award is presented to an outstanding cardiovascular physiologist in recognition of continued contributions to cardiovascular physiology. The award for 1990 was presented to **Vernon S. Bishop**, Professor of Pharmacology, University of Texas Health Sciences Center in San Antonio. Bishop was presented with a bronze plaque, and he presented a lecture entitled "Cardiac Afferents—The Ups and Downs of Cardiovascular Regulation."

D. M. Griggs, Jr.

IUPS Congress of Physiological Sciences August 1-6, 1993 Glasgow, Scotland

Honorary Memberships Granted to Glynn, Hokfelt, Paintal, and Skou

Scientists from Denmark, India, Sweden, and the United Kingdom have been conferred honorary membership in the American Physiological Society.

The new honorary members are: Ian Michael Glynn, Cambridge; Tomas Hokfelt, Stockholm; A.S. Paintal, Delhi; and, Jens Christian Skou, Aarhus, Denmark.

The Society now has a total of 29 honorary members.



Ian Michael Glynn

Ian Michael Glynn has been one of the most innovative and substantive contributors to the understanding of the function and molecular mechanisms of the sodium pump in eukaryotic cells. He has many firsts to his credit, such as the density of pumps on red cell membrane, the clarification and establishment of partial modes that the sodium pump can operate in, such as sodium-sodium and potassium-potassium exchange and uncoupled efflux.

He was the first to show the simultaneous presence of both intracellular sodium and external potassium and also was the first to show that by reversing the ion gradients that the pump can be reversed to synthesize ATP.

Glynn has been a Fellow of Trinity College, Cambridge, since 1955. He was appointed a Fellow of the Royal Society in 1970, and Honorary Foreign Member of the American Academy of Arts and Sciences in 1984, and an honorary MD at the University of Aarhaus in 1988.

He has served on both the British Medical Research Council and the British Agriculture and Food Research Council. He currently is Professor of Physiology and Chairman of the Physiological Laboratory in the University of Cambridge.



Tomas Hokfelt

Tomas Hokfelt is one of the fathers of what is sometimes called chemical neuroanatomy—the development of methods to make specific synaptic neurotransmitters visible under the microscope in the brain and other tissues so particular nerve pathways can be mapped so that alternations produced by drugs, various physiological states, and diseases can be analyzed. In the course of his work he made the major discovery that individual neurons contain more than one neurotransmitter.

Hokfelt's demonstrations that neurotransmitters coexisted in neurons and some neurons contain three or more different neurotransmitters effectively repealed Dale's Law and forced rethinking of old ideas and opened up major new vistas on the way the brain works.

Hokfelt is Professor of Histology in Cell Biology at the Karolinski Institutet in Stockholm, Sweden. He is a Foreign Member of the National Academy of Sciences (USA), an honorary member of distinguished scientific societies in many many countries, and most recently the winner of the Gogli Award from the Fidia Research Institute, the Artois-Baillet Latour Health Prize in Belgium, and the Bristol-Meyers Award for Distinguished Achievement in Neuroscience Research.



A. S. Paintal

A.S. Paintal probably is India's most prominent physiologist. He is known for his contributions to visceral sensory physiology such as the discovery of the Type B atrial receptors, gastric stretch receptors, ventricular pressure receptors, and the J receptors. These discoveries were the result of three techniques he introduced in his field, i.e., the technique of dissecting single afferent units from mammalian nerves under liquid paraffin, method of proving the conduction velocity of individual nerve fibers, and the technique of locating visceral sensory receptors by means of chemical substances.

An equally important contribution was his demonstration that conduction in mammalian nerve fibers, regardless of size, were all blocked at about the same temperature of approximately 7 degrees centigrade; a temperature that was clearly higher than that needed to block non-medullated fibers. Paintal also is known for his work on the effect of drugs on sensory receptors and for his contributions to chemoreceptor physiology. Although Paintal continues to be Professor of Physiology at the Vallabhbhai Patel Chest Institute of Delhi University, he is at present serving as the Chief of the Indian Council of Medical research where one of his interests is serving as co-chairman on the Indo-US Vaccine action program. He is a Fellow of the Royal Society of London and the Royal College of Physicians, London. He also is a Foreign Member of the Soviet Academy of Sciences.

Jens Christian Skou's primary contribution to science is the seminal discovery in 1957 of the membrane bound enzyme now called Na,K-ATPase. This discovery was pivotal in the development of the field of membrane biochemistry.

Before Na,K-ATPase was known, active cation transport was studied by kinetic methods involving net and tracer movements of ions. The ability to study Na:K pump characteristics by being able to measure Na,K-ATPase activity quickly established the ubiquity of the pump in essentially all animal cell membranes. Being able to work on Na,K-ATPase also has led to its isolation, purification, subunit structure, correlations of the event associated with translocation of ions with events of transphosphorylation, approaches to the pump's reaction mechanism, modes of actions of drugs, and the action of cardiotonic steroids, as well as many other fundamental properties.

Skou credits his start in research to the National Institutes of Health, which provided him with a grant at a time when little money was available for research in Denmark.

Skou is Professor of Biophysics, Institute of Biophysics, at the University of Aarhaus. He is a member of the Royal Danish Academy of Sciences and the Deutsche Akademie der Naturforscher Leopoldiana. He also has been awarded Leo Medical Prize, Novo Prize, Carlsen Prize, and Anders Retzius Prize of the Swedish Medical Society.

Honorary Members of APS

Pierre Dejours Derek A. Denton Setsuro Ebashi John C. Eccles T.P. Feng **Bjorn Folkow** Oleg Gazenko Ian Michael Glynn **Ragnar** Granit Roderic A. Gregory Bella Halasz Sir A.L. Hodgkin Tomas Hokfelt Sir Andrew F. Huxley Hugh E. Huxley Masao Ito Sir Bernard Katz Giuseppe Moruzzi Erwin Neher A.S. Paintal Johannes Piiper Jens Christian Skou E. Torsten A. Teorell Karl. J. Ullrich Hans H. Ussing Sir John Vane Ewald R. Weibel Silvo Weidmann

Strasbourg, France Victoria, Australia Okazaki, Japan Contra, Switzerland Shanghai, People's Republic of China Goteborg, Sweden Moscow, USSR Cambridge, United Kingdom Stockholm, Sweden Liverpool, United Kingdom Budapest, Hungary Cambridge, United Kingdom Stockholm, Sweden Cambridge, United Kingdom Cambridge, United Kingdom Tokyo, Japan London, United Kingdom Pisa, Italy Goettingen, Federal Republic of Germany Delhi, India Goettingen, Federal Republic of Germany Aarhus, Denmark Uppsala, Sweden Frankfurt, Federal Republic of Germany Copenhagen, Denmark London, United Kingdom Berne, Switzerland Berne, Switzerland

EDITORIAL

(contined from page 142)

likely scenario for fiscal 1991 is the passage of a Continuing Resolution appropriating funds at 1990 levels, followed by a rescission.

No matter how good the intentions of Bromley and the Bush administration are to insure increased funding for NIH, it still remains our responsibility to educate the public and our elected government officials that such an increase is justified. We must remind them that today's health care advances are a result of research initiated in the 1960s, when the federal government was allocating 4.8% of health care costs to research and development. Today, only 3% goes to R&D and half is derived from industry. We must remind them that the US is losing ground to Japan and West Germany because we devote only 1.8% of GNP to R&D, while the latter devote 2.8% and 2.6% of GNP, respectively. It is imperative that scientists have a voice in setting the benchmark on which research support will be based.

The message is clear. We must not accept the current manipulations to reallocate existing limited resources. As Bromley has suggested, we should lobby Congress and the Administration for additional funds for biomedical research in 1991 and 1992. We must not be complacent and expect someone else to get into the trenches to fight for needed resources. While the scientific societies can coordinate the public relations campaign, it is up to us individually to contribute to our own salvation. Each member of the APS, indeed each member of the scientific community, must get involved if the biomedical research establishment is to survive.

Martin Frank

Moving?

If you change your address or telephone number, please notify the APS office (301-530-7171) as soon as possible.

Animal Activist Groups Courting USDA, Not Romantically, But Litigiously

Animal activist groups again have filed suit against the US Department of Agriculture (USDA), this time in an attempt to seek more regulations and broader coverage of the Animal Welfare Act. The suit marks the second time in two years USDA has been sued by an animal activist organization.

The latest suit is a joint action by the Humane Society of the United States (HSUS) and the Animal Legal Defense Fund (ALDF), seeking to force USDA to include rats, mice, and birds under animal welfare regulations.

The American Physiological Society, which upholds animal welfare foremost and states so in its Guiding Principles, believes, however, the suit is counterproductive to animal welfare. Should the animal activists be successful, it would reduce to almost nil the Department's Animal and Plant Health Inspection Service's (APHIS) capability to inspect the nation's animal facilities. In addition to the inspection of animal facilities used for research, testing, and exhibitions, APHIS also would be required to inspect educational institutions from kindergarten, in some cases, up through the collegiate ranks, where animals are housed and studied.

The law gives the Secretary of Agriculture discretionary authority to determine what animals are to be covered by the Animal Welfare Act. The Act was amended in 1970 to define an animal "as any live or dead dog, cat, nonhuman primate, guinea pig, hamster, rabbit, or any other warm blooded animal, as the Secretary may determine, being used or intended for use for research, testing, experimentation, or exhibit purposes or as a pet."

Using discretionary authority, agriculture secretaries have never included rats, mice, or birds within the coverage of the Animal Welfare Act, largely because of the manpower requirements and fiscal limitations. The APHIS budget for the animal inspection program is less than \$10 million annually. To add rats, mice, and birds could increase the APHIS inspection program costs to \$250 million or more each year.

In announcing the suit, HSUS said, "The USDA, the federal agency charged with their (animals) care, has managed to exlude some 85 percent of the animals used from even the most basic standards for food, water, and shelter. It's a pity that USDA has to be sued to follow the law rather than circumvent it."

USDA citing the law's granting of discretionary authority, rejected HSUS and ALDF when they petitioned last year to have rats, mice, and birds included under the Animal Welfare Act umbrella.

Earlier last year Rep. Edolphus Towns (D-NY) introduced a bill (HR 2766) that would amend the Animal Welfare Act to include rats, mice, and birds within the definition of animals protected by the Act. The bill has been sitting on the shelf of the House Committee on Agriculture.

The current suit is the second filed against USDA by ALDF, which sued last year to force APHIS to promulgate standards to implement the 1985 amendments to the Animal Welfare Act. The federal district court in the District of Columbia gave APHIS until February 1991 to finalize all regulations pertaining to the 1985 amendments. (See related story in the Public Affairs section.)

Since that court action, Parts I (definitions) and II (administrative procedures) were finalized in October 1989 and a portion of Part III (new standards for guinea pigs, hamsters, and rabbits) was finalized in July 1990. APHIS is expected to publish the new standards for psychological well-being of nonhuman primates and the exercising of dogs by the February deadline.

New Standards for Dogs, Cats, and Primates Due Early 1991

The US Department of Agriculture (USDA) is expected to comply with a federal court order to have published by February 1991 all of the regulations for promulgating the 1985 amendments to the Animal Welfare Act.

The Animal Legal Defense Fund successfully sued USDA's Animal and Plant Health Inspection Service (APHIS) last year in an effort to force the finalization of the standards called for in the 1985 amendments.

Still to be finalized is a portion of Part III, which establishes new standards for the care and treatment of dogs, cats, and nonhuman primates. These standards include the controversial exercise for dogs and psychological well-being for nonhuman primates.

The regulations for Parts I (definitions) and II (administrative procedures) of the amendments were implemented by APHIS in October 1989 and a portion of Part III (new standards for guinea pigs, hamsters, and rabbits) was implemented in July 1990.

The originally proposed regulations for dogs, cats, and nonhuman primates brought APHIS a response of 10,000 letters of negative comment from the scientists, citing the costs (estimated to be at least \$1.75 billion) the proposed standards would inflict upon the research community and protesting the use of engineering standards as a means to determine standards for laboratory animal care.

In August, APHIS reproposed regulations for dogs, cats, and nonhuman primates, which will be finalized by February, unless there is another flood of negative letters of comment.

The reproposed regulations, by and large, do away with engineering standards by permitting facilities to develop their own standards for the exercise of dogs and the psychological well-being of nonhuman primates. The reproposed regulations would increase research costs, however, by an estimated \$552 million.

W.M. Samuels

3 Animal Activists Appeal Judgments

Two animal rights organizations and three individuals said they will appeal the \$3.1 million assessed against them after being found guilty of invasion of privacy and defamation of character.

In addition, Las Vegas District Court Judge Myron Leavitt fined the attorneys and the defendants a total of \$51,900 for what he called compromising the integrity of the court.

The actions stemmed from a monthlong trial where Bobby Berosini sued the animal activists and the organizations for releasing video tapes that show him disciplining the orangutans used in his show at the Stardust Hotel. He sought \$80 million for defamation, alleging that the released tapes damaged his career.

In the individaul judgments awarded Berosini, PETA (People for the Ethical Treatment of Animals) was assessed \$1.5 million and PAWS (Performing Animal Welfare Society) was assessed \$50,000. Jean Rousch, a PETA investigator, and Ottavio Gesmundo, a former Las Vegas Strip employee, were each assessed \$750,000, and Pat Derby, president of PAWS, was assessed \$50,000.

In addition to the judgments, Philip Hirschkop, attorney for PETA, was fined \$17,500 for his comments throughout the trial, including statements questioning the fairness of the procedure. He also was fined for failure to control statements that his clients and witnesses made to the news media.

PETA was fined \$10,000 for holding a news conference with personalities Rue McClanahan and Casey Kasem after they testified as defense witnesses. The integrity of the court was questioned at the news conference.

PETA president Alex Pacheco was fined \$10,000 for stating the court proceedings were "corrupt" and questioning the integrity of the court.

Attorney Robert Martin was fined \$12,500 for comments made during the trial and was cited for "manufacturing evidence" by wrapping an iron bar in black electrician's tape and having it marked as a proposed exhibit.

The three lawyers for the plaintiff Bobby Berosini were fined a total of



\$1,900 for making statements as to the testimony of witnesses instead of making proper objections and for talking out loud when witnesses were testifying.

AMA, CMA Voice Objections to Animal Group's Implications

Both the American Medical Association and the California Medical Association have told the Physician's Committee for Responsible Medicine that they object to the Committee's implications that physicians who support the use of animals in biomedical research are irresponsible.

The two organizations cited a recent survey of physicians that showed 99 percent agree that animal experimentation has contributed to medical progress; 97 percent support the use of animals in basic and clinical research; 96 percent support the use of animals in drug testing; and 93 percent support the use of animals for medical education.

165,000 Snails Liberated by Activists in England

In two separate raids, animal activists in England have entered snail breeding establishments and liberated an estimated 165,000 edible snails.

In the first raid, 3,000 adult and 150,000 juvenile snails were liberated and animal liberation slogans were painted on the walls. In the second raid, 6 weeks later at another breeding establishment, 12,000 snails were liberated and the

raiders set fire to the barn, causing £70,000 damage.

Snail breeding is a major industry in the United Kingdom, surpassing France.

AAMC Survey Reveals Majority of Medical Schools Use Animals

A survey by the Association of American Medical Colleges indicates that three-fourths of the medical schools continue to provide instructional sessions using live animals.

Of the 128 medical schools, 93 responded that they use live animals for instruction, contradicting claims by animal activists that medical schools no longer use live animals in the medical curriculum.

The survey indicates that up to 95 percent of medical students will have participated in instructional sessions using live animals and that 64 of the 93 schools instructing with animals offer alternative exercises for students who object. In 23 schools, refusal to attend live animal sessions affects candidacy for admission to or promotion in the medical program.

Senate Rejects Bill Limiting Animal Use in Toxicity Tests

The Senate in a record vote rejected a bill that would limit the use of animals in toxicity testing.

Senator Harry Reid (D-NV) presented his bill (S. 891), the "Consumer Product Safe Testing Act," as an amendment to the Farm Bill. After debate the measure was defeated when a motion to table the bill was approved by a vote of 62-29. It is believed that this bill is the first animal rights supported legislation to be debated and have a recorded vote in the Congress.

The bill is identical to a House bill (HR. 1676) that was introduced by Representative Barbara Boxer (D-CA) last year, but has not been considered for action by the House Committee on Energy and Commerce. Joey P. Granger has moved to the Department of Physiology, University of Mississippi, from Eastern Virginia Medical School. An active member of the Society since 1983, Granger is a member the Society's Long Range Planning Committee.

Formerly at the VA Medical Center in San Juan, PR, Manual Martinez-Maldonado has become chief, Medical Service at the Atlanta VA Medical Center in Decature, GA.

Candice D. Fike has moved from Baylor College of Medicine to the Department of Pediatrics, University of Utah, Salt Lake City.

Formerly in the New England Medical Center in Boston, Howard L. Corwin is now with the Division of Nephrology at Dartmouth-Hitchcock Medical Center, Hanover, NH.

APS member, **A. Michael Albisser**, formerly at the Magee Clinic, has accepted a position at the Better Control Medical Computer, Inc., Toronto.

Julie A. Swain of the National Institutes of Health has joined the Department of Surgery, University of Nevada School of Medicine, Las Vegas.

Richard L. Hebert, Vanderbilt University, has accepted a position at the University of Ottawa, Ontario.

Jon D. Dunn has been named professor and head of the Department of Anatomy and Physiology at Kansas State University. A member since 1973, Dunn was in the Department of Anatomy at Oral Roberts University.

Formerly at King Faisal University, Saudi Arabia, S. Jerome Putnam has moved to Saint George's University in Grenada, West Indies.

Sheilagh Martin, formerly at Mount St. Vincent University, Halifax, NS, has accepted a position in the Department of Medical Physiology, University of Calgary.

Henry W. Cryer, III, has left the University of Louisville to accept a position in the Division of General Surgery, University of California, Los Angeles.

AHA Medical Science Achievement Award

Marie M. Cassidy, professor of physiology, George Washington University received the American Heart Association's Medical Science Achievement Award at the 10th annual Washington Heart Ball. Cassidy's research has important implications for the maintenance of nutritional health and management of cardiovascular diseases. A member since 1973, she was instrumental in organizing the Society's Committee on Women in Physiology.

APS Members Elected to the Institute of Medicine



Thomas P. Almy, professor of medicine and community and family medicine, emeritus, at Dartmouth Medical School, has been elected to senior membership in the Institute of Medicine. Trained by Eugene Du Bois in the application of simple physiological methods to clinical investigation, he undertook the study of brain-gut relationships in humans under stress, and demonstrated their significance in the mechanisms of the irritable bowel syndrome and other "functional" disorders of the digestive tract. He viewed their patterns as biological accompaniments of emotional tension in both healthy persons and those with identifiable personality disorders, and his work strengthened understanding of mindbody relationships in this field. In work with younger colleagues he contributed to early studies of cholinergic effects on the human colon; the effects of autonomic denervation in Hirschsprung's disease; the pressure-volume relationships during distension of the bowel and their significance for the visceral pain threshold; rates of cell renewal in

Joseph C. Greenfield, Jr., James B. Duke professor of medicine at Duke University Medical Center, has been elected to the Institute of Medicine. Greenfield's primary area of research has been cardiovascular physiology. Specifically, his work has been directed toward defining the multiple factors that can regulate both the distribution and magnitude of coronary blood flow. These studies have been primarily in normal and myocardial hypertrophic dogs.



intestinal epithelium, as measured by tritiated thymidine; and the earliest systematic investigation of the role of gluten in the pathogenesis and treatment of celiac sprue. As a department head and professor-at-large, he has been more concerned with the quality of medical care, as influenced by the personal interaction between doctor and patient. He persists in the use of the biopsychosocial model as the basis for a clear understanding of this central phenomenon in patient care and for maximizing its effectiveness. Almy has been a member since 1959.

Eric Liljencrantz Award

John E. Greenleaf, NASA Ames research scientist, received the Eric Liljencrantz Award at the Aerospace Medical Association's honors banquet. Sponsored by SmithKline & Beecham, the award is presented annually for basic research into the problems of acceleration, altitude, or weightlessness. Greenleaf has devoted much of his career to exploring the physical effects of simulated weightlessness. His major interest is understanding the mechanisms of adaptation to environmental stresses such as exercise, heat, altitude, acceleration, water immersion, and bed rest, with special emphasis on the control of body fluid volumes, hormonal interactions, and the control of body

temperature during exercise stress. A major area of controversy has been whether exercise in orbit can be used to present the loss of tolerance for standing erect when space travelers return to Earth. Greenleaf's research found that a near-maximal isotonic training regimen of 2 30-minute sessions per day enabled bedrest subjects to maintain their aerobic capacity and plasma volume, but did not prevent the usual decreasing tolerance for upright tilt. In his study, Greenleaf demonstrated that orthostatic intolerance is unrelated to physical fitness or the decreased volume of circulating plasma in the body. Greenleaf has been a member of the Society in 1970.

Know Your Sustaining Associate

Genentech, Inc.

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

Future Meetings			
1991 FASEB Spring Meeting	April 21-25, Atlanta, GA		
Interactions of the Endocrine and Cardiovascular Systems in Health and Disease	Sept. 29-October 3, San Antonio, TX		
1992 FASEB Spring Meeting	April 5-10, Anaheim, CA		
Exercise Physiology Specialty Meeting	September 22-26, Colorado		
The Cellular and Molecular Biology of Membrane Transport	Early November, Florida or South Carolina		
1993 FASEB Spring Meeting	March 28-April 1, New Orleans, LA		
1994 FASEB Spring Meeting	April 24-29, Anaheim, CA		

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 *three months* (by the 5th of the month) before the desired publication date. Send all information to Martin Frank, Editor, *The Physiologist*, APS, 9650 Rockville Pike, Bethesda, MD 20814.

BOOKS RECEIVED

Patient Care in Neurosurgery. (3rd ed.) Nelson M. Oyesiku and A. Loren Amacher. Boston, MA: Little, Brown and Company, 1990, 317 pp., illus., index, \$37.50.

Adenosine and Adenosine Receptors. Michael Williams (Editor). Clifton, NJ: The Humana Press Inc., 1990, 528 pp., illus., index, \$89.50.

Practical Physiotherapy with Older People. Lucinda Smyth et al. New York: Routledge, Chapman & Hall, 1990, 160 pp., illus., index, \$25.00.

Molecular Cell Biology. Second Edition. James Darnell, Harvey Lodish, and David Baltimore. New York: Scientific American Books, 1990, 1105 pp., illus., index, \$52.95.

Computational Neuroscience. Eric L. Schwartz (Editor). Cambridge, MA: The MIT Press, 1990, 441 pp., illus., index, \$45.00.

Hypertension: Pathophysiology, Diagnosis, and Management, Vol. 1 & Vol. 2. John H. Laragh and Barry M. Brenner (Editors). New York: Raven Press, 1989, 2,592 pp., illus., index, \$325.00.

Lung Biology in Health and Disease. Claude Lenfant (Editor). The Lung in Rheumatic Diseases. (Series, Vol. 45). Grant W. Cannon and Guy A. Zimmerman (Editors). New York: Marcel Dekker, Inc., 1990, 545 pp., illus., index, \$125.00.

Comparative Physiology. R.K.H. Kinne, E. Kinne-Saffran, and K.W. Beyenbach (Editors). Cell Volume Regulation. (Series, Vol. 4) K.W. Beyenbach (Editor). Basel: Karger, 1990, 166 pp., illus., index, \$99.50.

Cardiac Hypertrophy and Failure. Bernard Swynghedauw (Editor). London, England: John Libbey & Company Limited, 1990, 700 pp., illus., index, \$125.00.

Neuromethods: 14 Neurophysiological Techniques. Alan A. Boulton, Glen B. Baker, and Case H. Vanderwolf (Editors). Clifton, NJ: The Humana Press Inc., 1990, 408 pp., illus., index, \$79.50.

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 American Medical Asssociation Beckman Instruments, Inc. Berlex Laboratories *Boehringer Ingelheim Burroughs Wellcome Company Ciba-Geigy Corporation Coulbourn Instruments, Inc. Dagan Corporation E. I. du Pont de Nemours & Company **Fisons Pharmaceuticals** Genentech, Inc. Glaxo, Inc. Gould, Inc. **Grass** Foundation Harvard Apparatus

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ANNOUNCEMENTS

FBR Premieres *Hope* – New Film in Support of Animal Research

Foundation for Biomedical Research is pleased to announce the availability of a new film-*Hope*. Filmed at Children's National Medical Center (CNMC) in Washington, DC and narrated by Judson Randolph, Children's surgeon-in-chief, *Hope* tells the moving story of the fight for life of three children and their families. "The contributions of animals to modern medicine, the agony of medicine's limitations, and hope for future knowledge from continued animal-based research are portrayed through these families," explained Randolph.

Produced in cooperation with CNMC and the Children's Research Institute, *Hope* portrays in human terms the vital importance of continued animal research.

One parent featured in the film observes, "If someone told me that it would be necessary to do away with animal research, I would say — in the nicest way I could say it — that without such research not only would my child not be here, but countless hundreds of children would not survive birth."

An excellent educational resource for institutions, community groups, schools, voluntary health associations, and medical societies, *Hope* is also available for television and cable broadcast.

Copies of *Hope*, a 17-minute videotape, are available from FBR for \$15.00 in 1/2" VHS and \$20.00 in 3/4" U-Matic. For more information, please call FBR at (202) 457-0654.

Call for Workshops: Association for Biology Laboratory Education (ABLE)

Each year, at its annual meeting, **ABLE** presents 12-15 reliable innovative hands-on workshops suitable for undergraduate biology laboratory courses. Workshops cover diverse disciplines and levels within biology, ranging from exercises aimed at non-majors to ones appropriate for advanced, specialized upper division courses. Workshops that successfully apply new ideas, materials, or approaches, or that use non-traditional organisms in a classroom setting are especially sought.

The 1991 meeting will be at the University of Wyoming, June 12-14. If interested in presenting a workshop, please contact the workshop chairperson by November 15, 1990. Contact: Jon Glase, Section of Neurobiology and Behavior, 1130 Comstock Hall, Cornell University, Ithaca, NY 14853, (607) 255-3007.

Call for Grant Applications – Nutrition and Cancer

The American Cancer Society is accepting applications from cancer centers and other academic institutions for its Special Institutional Grants on Nutrition and Cancer (SIG) Program. The purpose of the program is to stimulate interdisciplinary research on the role of nutrition in cancer. Emphasis is placed on laboratory and epidemiological studies that will identify dietary patterns and factors that may cause or prevent cancer.

The program is limited to a maximum of two new grant awards per year, and only one special institutional grant will be awarded per institution. Recipient institutions will be funded for periods of up to five years. The maximum award is \$200,000 per year, including 25% indirect costs.

Deadline for receipt of applications: March 15, 1991, for grants to be funded beginning January 1, 1992. *Information:* Research Department, American Cancer Society, Inc., 1599 Clifton Road NE, Atlanta, GA 30329. *Potential applicants contact:* Dawn Willis, Scientific Program Director, SIG Program (404) 329-7554, for application forms and guidance in preparation of the application.