THE PHYSIOLOGIST

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Activists Target Animal Dealers

Alice Hellerstein

Are random-source dogs and cats important to your research or teaching programs?

Do you know where your institution obtains dogs and cats?

Most importantly, do you know that their availability is being threatened?

APS is looking ahead to the possibility that animal activists will try next year to eliminate a major source of the dogs and cats used in research: the USDA-licensed Class B dealer. Read on for details about how this could affect you and to learn what you can do.

Where are dogs and cats for research obtained?

The two sources of dogs and cats for research are pounds and shelters and animal dealers. Dogs and cats are among the species regulated under the Animal Welfare Act, which is the federal government's primary animal care law. The Animal Welfare Act also regulates how research animals may be bought and sold, and it mandates that the USDA license two categories of dealer, Class A and Class B.

Class A dealers are breeders whose business involves animals bred and raised on their own premises. Purpose-bred animals are estimated to comprise about 40% of the dogs and cats used in biomedical research. These are the animals typically involved in studies wherein subjects must have a controlled genetic background. Purpose-bred animals are considerably more expensive than the "random-source" animals obtained from pounds, shelters, and Class B dealers.

Class B dealers buy and sell animals bred and raised by others. Such animals have a diverse or "random" genetic background. They are used when this genetic diversity is preferable, e.g., to study immunologic responses to transplantation, or when other factors come into play, such as a need for older animals or to keep research project costs down.

Why is Congress concerned?

Rumors that stolen pets were ending up in research labs go back many years. Preventing pet theft was the major purpose of the original Animal Welfare Act enacted in 1966. The act was last amended in 1990 with the addition of new restrictions on how and from whom dogs and cats can be acquired for research purposes. National animal rights and animal welfare organizations have raised concern about so-called "pet theft" for many years. In her 1992 book, *Stolen for Profit*, journalist Judith Reitman alleged that as many as two million family pets are stolen each year and sold illegally to pet stores, puppy mills, dog-fighting rings, and satanic cults. "But," she wrote, "by far the most valued and reliable buyer for these animals is the medical research industry, which can pay premium tax dollars for preferred laboratory subjects: family pets, no questions asked."

For many years Members of Congress have consistently reported a high volume of mail from animal activists, and pet theft has become a major theme in those letters. The media, too, has picked up on this issue. Stories have appeared everywhere from supermarket tabloids to national news broadcasts. For example, in 1993, the CBS news magazine "Eye to Eye with Connie Chung" aired a segment focusing on specific allegations of trafficking in stolen animals involving USDA-licensed Class B dealer Jerry Vance. The USDA has since

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ACTIVISTS TARGET ANIMAL DEALERS

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permanently disqualified Vance from operating as a dealer after he signed a consent decree in the face of charges that he falsified records and failed to maintain proper records or to provide adequate care for his animals. Pet theft was not proven in this case; failure to comply with the requirements of the Animal Welfare Act was sufficient grounds for USDA to revoke his dealer's license.

The question remains on how prevalent illegal trafficking in pets is. Animal activists say it runs rampant, and they accuse the research community of outright complicity. According to Reitman, existing laws intended to protect people's pets are "not being enforced because the government is in a long-standing economic relationship with an industry that depends upon the delivery of stolen merchandise." Thus the medical research community stands accused before Congress and the American people of knowingly using stolen pets for research by purchasing them from disreputable Class B dealers.

Why is this important now?

In 1995, many USDA programs are due for legislative renewal, which is known as the reauthorization of the farm bill. The farm bill has often been a legislative vehicle for federal animal research policies. Since many animal activist organizations have taken up pet theft as a cause celebre, it is expected that there will be a push to pass legislation intended to end pet theft by prohibiting Class B dealers from providing animals for research.

APS will be there to give Congress the facts, but we will need every member's help.

How does the Animal Welfare Act protect pets?

The Animal Welfare Act makes it a federal crime to buy or sell stolen animals or to obtain dogs and cats using false pretenses, misrepresentation, or deception. By law, Class B dealers may acquire animals only from people who have bred and raised the animals themselves, from pounds and shelters, and from other Class B dealers. Class B dealers must keep extensive records on each animal they handle, including its full description and identifying information on the person who provided the animal. The dealer must retain these records for at least one year, and research facilities must keep the paperwork for at least three years.

The law now also provides for mandatory holding periods to help owners locate lost pets. Pounds and shelters must hold dogs and cats for 5 days before transferring them to Class B dealers. Class B dealers must then hold them for an additional 5–10 days before they can be transferred to research facilities, thus giving owners a total of 10–15 days to locate a lost pet. Class B dealers are required to follow federal animal care and handling standards, just as research facilities do, and the USDA has the authority to conduct unannounced inspections to search for missing animals and to confiscate any animal if its life is in danger.

The research community has long been concerned that the USDA's Animal and Plant Health Inspection Service (APHIS) does not have the resources to provide adequate inspection oversight of Class B dealers. The APS supports efforts to increase APHIS inspection resources and each year asks Congress to provide APHIS with the funds it needs to do its job. Some research institutions also do community outreach to educate the public about responsible pet ownership, including how to identify pets with tattoos or computer chip implants in case they get lost. APS would like to hear from members about their institutions' outreach programs to get an idea of their prevalence so we can provide this information to Congress in the context of the upcoming policy debate.

What happens if Class B dealers are eliminated as a source for research animals?

The National Association for Biomedical Research (NABR) recently conducted a survey of major research facilities to assess the potential impact of an elimination of Class B dealers. The survey found that about 45% of the dogs and cats involved in research came from Class B dealers. Some 40% were purpose-bred animals, and the remainder were mostly random-source animals that came directly from pounds and shelters. No doubt some Members of Congress may conclude from these data that research facilities could simply switch to these two sources as alternatives to Class B dealers, but there are significant problems with both of these options.

Why not switch to purpose-bred animals?

There are ethical, scientific, and economic reasons why this solution is not viable. Switching to purpose-bred animals would be ethically unacceptable because it would be wasteful of animal life: the millions of dogs and cats destroyed by pounds and shelters each year would still die, and another 100,000 animals would have to be bred for research. In the most recent data available, the American Humane Association estimated that in 1988 between 17 and 27 million dogs and cats entered the nation's pounds and shelters. Two-fifths of those animals were brought there by owners who no longer wanted them, and the remainder were lost or feral animals. Some 10–16 million of these animals were euthanized because there were no homes for them and they could not be cared for indefinitely.

The newly released FY 1993 USDA *Animal Welfare Enforcement* report indicates that nationwide some 140,000 dogs and cats were involved in research facility programs last year. Based on the NABR survey, it is reasonable to surmise that about 93,000 of those animals were random source. It should also be noted that the number of dogs and cats used in medical research has been steadily declining in recent years. One should use the USDA-reported figures as a reality check by comparing it with the 10 to 16 million animals euthanized by pounds and shelters. One should also compare it with Reitman's allegation that 2 million pets each year are stolen and that research labs are the "most valued and reliable buyer."

Switching from random-source to purpose-bred animals would also pose significant scientific problems. The research model would be different, which would mean that new findings would no longer be comparable to earlier data. This change could delay some lines of research considerably because of the need to rebuild baseline. Furthermore, older and larger animals would effectively become unavailable because breeders would be unwilling to raise them. Researchers might be able to switch to another species, but the same problems of rebuilding historical data would apply.

Finally, there is an economic issue. The NABR survey found that whereas the average price of a Class B dealer-supplied dog ranged from $65 to $560, purpose-bred dogs cost an average of $260 to $995. At a time when medical research funding is constrained, we ought not to be wasting scarce resources by utilizing more expensive purpose-bred animals needlessly.

Why not just use pound animals?

Using pound animals for research would seem to offer another simple solution, since 10–17 million are euthanized each year. Furthermore, some states have addressed the concerns of pet owners by instituting forms on which one may indicate whether or not an animal may be released to a research facility.

So why not just use pound animals? Because 13 states (including New York and Massachusetts, which have large

research facilities) have passed laws that forbid pounds and shelters from providing animals for research. Massachusetts goes further to forbid research involving pound or shelter animals obtained from any state. Furthermore, local governments in many other states also prohibit pounds from providing animals for research. So there are places where Class B dealers are the only legal suppliers of random-source animals.

Then what is the answer?

Unfortunately, there is no easy solution. Having succeeded with pound bills in a dozen states, it would seem that the animal activists are using extravagant claims about pet theft to cut off the last source of random-source animals for many researchers. There are problems with the existing system, but many important safeguards have been incorporated into the law and institutions are taking other actions voluntarily. APHIS ought to be provided with more resources. Most importantly, Members of Congress who until now have gotten all their information thus far from animal activists will need to hear the rest of the story.

What can you do?

Next year we expect hearings on various issues related to the Animal Welfare Act and specific legislative proposals, such as those concerning Class B dealers. In the meantime, APS wants to put together information about the importance of Class B dealers to research and elaborating on the kinds of voluntary safeguards institutions already provide. Your responses to the following questions will enable us to formulate APS positions and policies:

- How would the elimination of Class B dealers affect you and your institution?
- What does your institution do now to verify that random-source animals are not lost or stolen?
- Does your institution engage in outreach to the community to help people make their pets identifiable as such?
- Does your institution spot check its Class B dealers?

Please provide information on these issues to APS Public Affairs Officer Alice Hellerstein [Tel: (301) 530-7105; fax: (301) 571-8305; e-mail: alice@aps.mhs.compuserve.com]. You can also help by volunteering to join the new APS Net-Alert to receive timely updates on critical animal research and biomedical funding issues. For further information on Net-Alert, see page 298.

Black Physiologists—Where Are They?

In 1972, the National Institute of General Medical Sciences (NIGMS) informally established the Minority Access to Research Careers (MARC) program. This action signaled an awareness of the underrepresentation of minorities in the biomedical sciences. It is fair to state that the initial focus at that time was directed toward the representation of African Americans as the principal "minority" concern. During this early period, Leslie Costello was on the faculty of the Department of Physiology at Howard University College of Medicine as Professor (from 1968 to 1980) and as Chairman from 1975–1979.

In May of 1974, NIGMS through the MARC office created a new program to support PhD training in biomedical sciences at minority institutions. The funding for this program came from a General Accounting Office ruling that the Administration (President Nixon's office) had illegally withheld appropriations, which had to be released for immediate spending prior to the end of the fiscal year. An emergency notification and announcement that described this new program was provided to eligible minority institutions. Competing institutions were requested to hastily submit applications for funding by June 30, 1974. Howard University was a recipient of these PhD program awards: one in zoology, one in pharmacology, and one in physiology. The physiology award in the amount of $900,000 was for five years. This MARC program probably represented the first significant federal–initiated effort to deal with the obvious underrepresentation of African Americans in the biomedical sciences, including physiology. However, it arose from a "windfall" budget and an expeditious extemporaneously designed program.

In 1978, NIGMS, through the MARC office, announced that 1979 (the conclusion of the initial five–year award) would be the terminal year for the MARC PhD Training Programs. No additional funding for continuation had been budgeted by NIGMS. This was a "one–shot" program! The events that followed are noteworthy. With the noted exception of Warren Ashe (Assistant Dean for Research at the School of Medicine, Howard University) and Costello (then Chairman of the Department of Physiology and Director of the PhD Training Award), the abandonment of this MARC program was accepted as a fait d'accompli. At that time, Costello had composed a report on the status of black physiologists. This 1978 report contained the available statistics, which continued to demonstrate the severe underrepresentation of African Americans in the biomedical sciences. Ashe and Costello met to discuss this problem and the decision of NIGMS to abort this MARC program. They agreed that the decision by NIGMS to abolish this program should be challenged. They prepared a brief including this 1978 report, which was forwarded to Ruth Kirschstein (Director of NIGMS) and Elwood Bynum (Director of MARC), and requested a meeting to discuss the NIGMS decision and the fate

of the PhD Training Program. A meeting was granted, and it included Kirschstein, Charles Miller (Special Assistant to the Director of NIGMS), Bynum, and a contingency from Howard University including Ashe and Costello Apparently Ashe and Costello made a strong and compelling presentation, which resulted in the reversal of the NIGMS decision and the continuation of the MARC PhD Training Program with new funding.

This bit of historical perspective is important. It illustrates the floundering beginning of the efforts to deal with the important issue of underrepresentation of African Americans in the biomedical sciences. Since those early times, numerous federally and privately funded programs have been established to address and to alleviate this underrepresentation. MARC programs alone over the period of 1972 to the present have expended 130 million dollars. In the early years, the overwhelming majority of this funding was directed to the issue of African American representation. Enormous resources have been applied to deal with the issue of underrepresentation of African Americans, which is the focus of our concern.

In applying these circumstances to physiology, one must ask questions: What have we achieved over the past 25 years in dealing with the issue of an underrepresentation of black physiologists? Are we succeeding in alleviating this issue? Have we failed to improve substantially this historic problem? If we have failed, why? These and other questions require that we pause for a moment and look at the results over this period of time.

The following is an excerpt from the 1978 report. This excerpt will serve as a reference point for evaluation of progress or lack thereof.

> *The past decade (1966–1976) has seen little or no alleviation of this chronic underrepresentation of Black professionals in Physiology. Recent statistics pertaining to the training of Black physiologists are generally contained within statistics on Life Sciences or Medical Sciences doctorate programs. According to the National Board on Graduate Education (June 1976 report) in the 1973–1974 period, no doctoral degrees were awarded to U.S. naturalized Black citizens (0 of 171 Ph.D.'s awarded); for U.S. native–born Blacks, 28 of 1,324 Ph.D.'s awarded received degrees in basic medical sciences (including physiology, anatomy, biochemistry, microbiology, pharmacology, and other areas). This is a representation of only 2.1 percent. These data are also consistent with ACDP data showing that Black Ph.D.'s in Physiology comprise about 2 percent or less of all Ph.D.'s awarded in Physiology. It was further reported by the ACDP that 1 Black Ph.D. physiologist was graduated in 1976 (from 36 departments responding). Extrapolating to all departments in the U.S. (exclusive of Howard University), perhaps 5 Black Ph.D. physiologists were graduated in that year.*

There are two criteria upon which we would evaluate progress in addressing the issue of underrepresentation of African American physiologists. One criterion is the number and percentage of graduating African American PhDs in physiology. The other criterion is the number and percentage of black faculty members in Departments of Physiology. Data regarding these criteria are available in the annual reports of the Association of Chairmen of Departments of Physiology (ACDP). We have compiled the data from the ACDP reports as presented in Tables 1 and 2. Table 1 presents information concerning the completion of PhD training over the reported period of 1978–1992. It is apparent that over the 14–year reporting period there is no consistent trend of an increase in the number or percentage of African Americans receiving PhD degrees from the reporting departments. Other than the years 1988 and 1989, the most recent seven years are no different than the earliest seven years of this reporting period in the production of black physiologists.

Table 2 presents the representation of African Americans on the faculty of Departments of Physiology. Over the reporting period of 1986–1992, black physiologists consistently represented 1.2–2.0% of the faculty complement; i.e., neither

Table 1. PhDs Received by African Americans in Departments of Physiology

Year:	1978	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
No. of departments				103		103	91	89	100	105	103	113	88	78
Total PhDs granted	167	190	165	137	153	135	113	98	143	157	184	222	180	126
African Americans														
No.	3	7	3	4	2	3	1	2	3	9	9	3	1	2
%	1.7	3.6	1.8	2.9	1.3	2.2	0.8	2	2	5.7	4.9	1.4	0.5	1.6

the number nor the percentage of black physiologists has changed since 1986. The statistics presented in Tables 1 and 2 relating to black physiologists are reflective of the same level of underrepresentation that existed in the early 1970s. In fact, our earlier concerns and recognition of this problem have been the reasons why we have continually reviewed the data presented by the ACDP annual reports.

How far can one go in interpreting the meaning of the data presented in this report? The data are based on annual reports from 78–113 Departments of Physiology and an average of 98 departments annually. This is a significant sample representing about 60% of the ACDP member departments. Moreover, it is not likely that the responding departments are the same departments over the reporting period. Consequently, more than 113 different departments are represented in the composite data. Since the data are remarkably consistent from year to year, the data are representative of a larger number of departments than is represented by the reporting number. Consequently, we must conclude that these statistics are representative of the conditions that exist nationally. On the basis of the information concerning the two criteria that were analyzed, one must conclude that there has been no significant or meaningful increase in the representation of African Americans in the field of physiology. Even if one does not accept this as a national conclusion, one is hard pressed to explain why this condition persists in over 100 Departments of Physiology across the country.

How can one justify that in 1982 103 Departments of Physiology graduated 4 black PhDs out of 137 PhDs awarded and in 1990 113 departments of Physiology graduated 3 black PhDs out of 222 PhDs awarded? How can one explain that in 1986 black physiologists represented 1.2% of the faculty complement of 89 reporting Departments of Physiology and in 1992 black physiologists represented 1.4% of the faculty of 78 reporting Departments of Physiology? These statistics are reminiscent of the conditions that were described in our 1978 report concerning the approximate period of 1966–76. It is probably fair to assume that in recent years most, if not all, of these departments have introduced strong recruitment efforts to increase the African American representation in their programs. On the basis of this assumption and the existence of various and numerous minority–directed funding programs over this period of time, the continuation of this underrepresentation is even more confounding and perplexing.

We were disappointingly surprised at these statistics and their representation. It is likely that other criteria could reveal a somewhat different picture. It is probable that specific departments can and will present much better progress than is represented by these composite data. Nonetheless, the lack of progress revealed by this report must be addressed. Furthermore, it is hard to imagine that these statistics are unique to physiology. It would be most important and interesting to establish if similar circumstances are applicable to other biomedical sciences, especially other member groups of FASEB.

The next important questions are: Why do these statistics exist? Why is there no apparent increase in the number of graduating black physiologists and the faculty representation of black physiologists? Have 25 years of special funding and special programs been so completely ineffective? Perhaps there has been an increase in black physiologists that is not represented in the pool of departments responding to ACDP. The responding departments might not include the historically black colleges and universities such as Howard University, Meharry, and others. Perhaps there exist "enclave institutions and departments" to which developing black physiologists immigrate and pursue their careers. If this is the case, the problem becomes more complex and difficult to address. We cannot be satisfied with predominantly segregated physiology environments. Have the funds and resources been inadequate to deal with the problem? Have the programs been misdirected and ineffective despite considerable funding?

It is not the intent of this report to answer these questions. We will not attempt at this time to analyze the possible reasons for the lack of progress. We do not pretend to have the solutions at hand. It is our intent to identify an important issue that must be addressed and resolved. We believe that the next step is to commission an "appropriate" group of individuals to address this problem and to make significant recommendations to resolve the problem. This is not going to be an easy issue to address. We, the authors of this report, are prepared to serve on such a group.

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Table 2. African American Faculty Representation in Departments of Physiology

Year:	1986	1987	1988	1989	1990	1991	1992
No. of departments	89	100	105	103	113	88	78
Total positions	1,152	1,427	1,450	1,420	1,635	1,415	1,173
African Americans							
No.	14	28	25	14	27	17	16
%	1.2	2	1.7	1	1.6	1.2	1.4

What's in a Name?—A Response

I am troubled by Schultz's article ' "What's in a Name?" ' (1) in which he clearly accepts that for practical purposes the whole is greater than the sum of its parts. He states that Claude Bernard's words written 130 years ago are as true today as when they were written. Bernard wrote, "when we unite physiological elements, properties appear which were imperceptible in the separate elements. . . . All this proves that these elements, though distinct and self-dependent, do not therefore play the part of simple associates; their union expresses more than addition of their separate properties." This is an excellent justification for intensive, focused study of intact organisms regardless of the quantity of date about their parts. However, Schultz uses it in an attempt to justify replacing the term "physiology" for our discipline by "integrative biology." It would be tragic if we replaced the term physiology, which describes the discipline that most members of APS are engaged in, by a term that has much less relation to what we do. Biology includes other disciplines such as anatomy and taxonomy in addition to physiology, which most of us know very little about. Integrative implies that we can understand the behavior of complex hierarchical systems by simple extrapolation from the study of the behavior of simpler parts of this system and that we intend to do so. In fact, during the five years since the APS long-range planning committee suggested the change in name, the "young Turks" engaged in the currently fashionable cellular, subcellular, and molecular physiology have made this unrealistic promise as the basis for obtaining more research funds. A particularly dangerous application of this concept is occurring in medical school physiology departments, the chairs of which have decided to train only molecular physiologists because of the enormous recent successes in characterizing genes that encode specific small proteins (2). They propose to use their data in a bottom-up approach that will eventually explain the working of a complex organism. The two examples that are cited in which the cloning of specific proteins has increased our understanding of specific membrane transports in some cells can hardly be called synthesis or integration. In the case of the cystic fibrosis gene we have learned a great deal more about a serious genetic disease. However, this knowledge was obtained by the collaboration of two large teams, each of which had at least a dozen investigators with many different technical skills. Prominent in each group were physicians who had been trained in classic organ physiology and could therefore apply the new information from the cellular and membrane levels to better understand the disease in about half the patients with cystic fibrosis. Where will people with comparable skills at synthesis come from if medical school faculties and their graduate students spend their resources on molecular biology? A first principle of the hard sciences (in which I include Physiology) is the precise, unambiguous definition of all terms used. This makes meaningful communication among scientists possible and is, I believe, largely responsible for the enormous success of the natural sciences. In view of the more and more careless use of words in our society, this first principle must be taught again and again to our graduate students. They must learn that words and symbols carry meaning and to use only those that clearly express this meaning. How can we justify using a term (integrative biology) that does not clearly describe what we do and use it as the first word a potential student encounters?

I can understand Schultz's frustration at the layman's incomprehension of what it is that we do. All of us in the profession have experienced this, I myself encountered blank stares several times a year in every one of the 35 years since I began calling myself a physiologist. Those who thought that they understood what I do generally thought that I was a psychologist or a physiotherapist! Fortunately, this situation has recently begun to change. Although people still do not know what physiologists do, I find that they are vaguely embarrassed by this fact, i.e., they realize that they should know. I attribute this change in attitude to the frequent correct use by the media of the term physiological to mean normal function in healthy people. I now welcome the question "what do you do?" and use the opportunity to educate my questioners. I give them the dictionary definition of physiology, which has not changed in more than 100 years, i.e. "physiology is the study of the function of (how things work in) living organisms" and add that, for obvious reasons, the organism society is most interested in is the human body. For this reason I and most physiologists working today are engaged in studying and teaching how the human body works. Frequently, I am then asked whether our profession is not somehow related to medicine. The answer to that, of course, is that physiology is the basis of all medicine. Physicians must first know how the healthy body functions before they can learn to diagnose and treat abnormal function.

1. Schultz, S. G. "What's in a Name?" *The Physiologist* 37: 163–166, 1994.
2. Neill, J. D., and J. D. Benos. Relationship of molecular biology to integrative physiology. *News in Physiological Sciences* 8: 233–235, 1993.

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APS Membership

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

Membership

Honorary Memberships Awarded to Two Distinguished Scientists

Hermann Passow has been a key figure in the field of ion permeability for many years. Although his primary focus has been on the mechanism by which anions cross the red blood cell membrane, he has also made substantive contributions in the other areas. Beginning in the 1960s he began considering how fixed positive changes in the membrane modulated anion permeability, and since then he has continued to pursue this theme at increasing levels of sophistication. He was one of the first to use group-specific agents to identify function membrane residues as well as the sided properties of these groups relative to anion transport. This work led directly to his identification of the function of Band 3 in the red blood cell membrane as the anion transporter, which was independently discovered at the same time by Cabantchik and Rothstein using different anion-permeability inhibitors.

Passow was educated at the Universities of Gottingen and Hamburg, where he received his PhD in physiology in 1951. He did postdoctoral fellowships at the University of Hamburg and at the Institute of Radiology and Biophysics in Rochester, NY. He was Chairman of Physiology of the University if Saarland from 1962 until 1970, when he was appointed as Director of Physiology for the Max Planck Institute.

Richard Darwin Keynes was educated at Trinity College, Cambridge, UK, and received his PhD in 1949 and his ScD in 1965. He was a demonstrator and later a lecturer in physiology at Cambridge from 1949 to 1960 before becoming first head of the Physiology Department, then Deputy Director, and finally Director of ARC Institute of Animal Physiology at Babraham, from 1960 to 1973. From 1973 to 1986, he was Professor of Physiology and Head of Department at Cambridge University.

Keynes' contributions to our understanding of the physiology and biophysics of electrically excitable membranes are legion. He pioneered the application of radioisotopes of sodium and potassium to the study of ion movements across the membrane of squid axon and thereby directly confirmed the conclusions of Hodgkin and Huxley based on electrical measurements, findings that established the cornerstone of the ionic hypothesis of nervous conduction. He was among the first to demonstrate the role of high-energy phosphates in energizing the sodium pump. In 1955, he and Hodgkin introduced the now universally accepted term "channel" to describe the diffusional pathways for the movement of sodium across the membrane of squid axon, and, in later years, Keynes was among the first to study charge movements accompanying the opening and closing of those channels ("gating currents").

Keynes, who is a great-grandson of naturalist Charles Darwin, is presently producing an edition of his famous ancestor's zoology notes from the voyage of the *Beagle*. In 1979 he published *The Beagle Record,* which consisted of a catalogue of Charles Darwin's drawings as well as early letters and other writings.

In Memoriam

János Szentágothai (1912–1994)

János Szentágothai, honorary member of APS since 1992, died on September 8th, 1994. Born in 1912, he graduated from medical school in 1936 in Budapest, Hungary, where he began his research under Mihály Lenhossék. After the war he became the director of the Institute of Anatomy of the Medical University of Pécs, and in 1963 he became the Head of the First Department of Anatomy in Budapest. Later he became the President of the Hungarian Academy of Sciences, and during the transition to democracy he was a deputy in the newly free Parliament. An almost uninterrupted flow of discoveries for over half a century made him one of the foremost neuroanatomists of our time. His goal was to reveal how the structure and interconnections of neurons underly their function. There are few parts of the understanding of the mammalian central nervous system to which he did not make significant contributions. His insight into the unity of structure and function is clearly exemplified in his part of the book by Eccles, Ito, and Szentágothai, *The Cerebellum as a Neuronal Machine* (Springer, 1967). He was a scholar of the old mold, of broad vision and wide ranging interests, and of an unbending personal moral integrity, preserved even in the storms that buffered his home country during his lifetime.

Membership Committee Report

The membership committee reviews applications in the spring and fall of each year. This fall we recommended acceptance of a total of 115 applications for membership. Of these, about one-fourth were from countries outside the Americas. This brings the total number of new members to 314 for 1994, a number more than 40% in excess of the total 1993 figure of 222 new members.

The primary reason for this increase is the relaxation of rules governing acceptance into the APS. The sole purpose of the change in the bylaws with regard to membership was to encourage young investigators to take a more active role in APS, and, indeed, in the future of physiological and biomedical research. The transition from the old bylaws to the new rules occurred over the course of 1994. Therefore, it is instructive to compare the profile of members accepted in the spring versus fall periods.

As indicated in Table 1, the relative number of junior to senior members applying jumped 20% in the regular membership category and 8% in the corresponding membership category. These marked changes were not seen in last year's comparison of spring and fall submissions. The corresponding change in age was modest in the regular membership group (40 versus 42 yr, on average) while there was no difference in the average ages of those corresponding members applying in the fall versus spring.

The membership committee hopes that these trends continue, both in an increased number and a more junior rank or younger age of the applicants.

Finally, this report marks the end of the term of office of the Chair and another committee member, **Michael J. Davis** of Texas A & M University. On behalf of both of us, it has been a pleasure to serve APS in this capacity.

Diana Marver, Chair

Table 1. New Members, 1994

Group	Period	Total No.	Average Age, yr	%Junior Rank	%Senior Rank
Regular members	Spring	130	42	49	51
	Fall	86	40	69	31
Corresponding members	Spring	69	43	58	42
	Fall	29	43	66	34

Junior rank is defined as < Associate Professor, and senior rank is defined as ≥ Associate Professor.

Membership Status

Newly Elected Members

The APS Council elected the following to membership at its 1994 Fall Meeting, San Diego, CA.

Regular

Ruth A. Altschuld
Ohio State University

Ana M. Azzarolo
University of Southern California

Alia Bazzy-Asaad
Yale University

Elisabeth Bloch-Salisbury
Harvard School of Public Health

Roger C. Bone
Medical College of Ohio

James B. Boone
University of Missouri

Frank J. Bosso
Northeastern Ohio University

Ina P. Brown
University of California, San Diego

Leslie T. Buck
University of California, San Francisco

Guillermo M. Ceballos
National Institute of Cardiology

Fahua Chen
University of California, Los Angeles

Deepak K. Chugh
University of Pennsylvania

Blair H. Colbert
University of Alabama, Birmingham

Manning J. Correia
University of Texas, Galveston

Edward E. Diehl
Mayo Clinic

Patrick M. Dougherty
Johns Hopkins Medical School

Elizabeth D. Dunlap
Baxter Healthcare Corporation

Jeffrey F. Dunn
Dartmouth Medical School

Keith A. Engelke
University of Florida

Jeff C. Falcone
University of Kentucky

Massimo Ferrigno
University of South Alabama

Roger A. Fielding
Tufts University

Yuansheng Gao
Harbor-UCLA

Tong Ge
Baylor College of Medicine

Eugene V. Golanov
Cornell University

James A. Goldstein
Washington University

Fredric A. Gorin
University of California, Davis

Mark E. Gunning
New England Deaconess Hospital

Christopher Hardin
University of Missouri

Guo-Wei He
St. Vincent Heart Institute, Portland

Miao-Xiang He
University of North Texas

Kathe G. Henke
University of North Texas

Thomas C. Herzig
Medical College of Wisconsin

William W. Holt
University of Illinois, Chicago

David C. Homans
University of Minnesota

Pauline Hsu
University of Tennessee

Stephen C. Jones
Cleveland Clinic Foundation

Kwang-Jin Kim
University of Southern California

Wendy M. Kohrt
Washington University

Harold E. Layton
Duke University

Huabao Lin
University of Mississippi

David P. Lotshaw
Northern Illinois University

Montano R. L. Manuel
National Autonomous University of Mexico

Richard Marchase
University of Alabama, Birmingham

Carole L. Marcus
Johns Hopkins Hospital

Marina Marjanovic
University of Illinois, Urbana

Cynthia L. Martin
Searle

Donald R. McCrimmon
Northwestern University

Donald J. Meyer
University of Rochester

Holly R. Middlekauff
University of California, Los Angeles

John H. Miller
Victoria University

Evangeline D. Motley
Meharry Medical College

Douglas P. Munoz
Queen's University

Candace S. O'Connor
Portland State University

Mitchell A. Olman
University of Alabama, Birmingham

Paul M. Palevsky
University of Pittsburgh

Thomas L. Pallone
Milton S. Hershey Medical Center

Pamela A. Pappone
University of California, Davis

Annette G. Pashayan
University of Florida

Brenda J. Peters
St. Ambrose University

Marc J. Poulin
University of Oxford, England

Sumanth D. Prabhu
University of Texas, San Antonio

Esperanza Recio-Pinto
Cornell University

Jianming Ren
Miles Inc.

Jacques R. Rouleau
Laval Hospital, Quebec

Roy D. Russ
Mercer University

Steven J. Schiff
Children's National Medical Center

Jie Shan
CV Technologies, Inc.

David H. Sigmon
Henry Ford Hospital

Francis R. Simon
University of Colorado

James V. Sitzmann
Johns Hopkins Hospital

Ronald L. Sorkness
University of Wisconsin

James E. Springate
SUNY, Buffalo

Richard Stephenson
University of Toronto

Raul K. Suarez
University of California, Santa Barbara

Miao-Kun Sun
Cornell University

Colleen Rebecca Talbot
University of North Carolina

Robert J. Talmadge
University of California, Los Angeles

Michael J. Taylor
Iowa State University

B. Taylor Thompson
Massachusetts General Hospital

Donna M. VanWinkle
Oregon Health Sciences University

Rocco C. Venuto
Erie County Medical Center

Gus J. Vlahakes
Massachusetts General Hospital

W. Lee Wilke
Colorado State University

Lid B. Wong
University of Illinois, Chicago

Jianyi Zhang
University of Minnesota

Corresponding

Jonathan S. Beck
Unilever Research Port Sunlight Lab

Barnard Delbarre
Faculty of Medicine, Tours

Patrick J. Doyle
Lab Recherches Metaboliques, Geneva

Jean Fioramonti
Institut National del la Recherche Agronomique, Toulouse

Simon C. Gandevia
Prince of Wales Medical Research Institute

Jack A. Groot
University of Amsterdam

Rene Groscolas
Centre National de la Recherche Scientifique, Strasbourg

Otto Hansen
University of Aarhus

Barry H. Hirst
University of Newcastle upon Tyne

Luc Hittinger
Institut National de la Sante et de la Recherche Medicale

Fumitaka Ikomi
Shinshu University

Shin-ya Kuno
University of Tokyo

Aihua Li
Wu Soug Central Hospital of Shanghai

Andreas S. Luebbe
University of Louisville

Claire Lugnier
University of Louis Pasteur

Helgo Magnussen
Krankenhaus Grosshansdorf

Dewan S.A. Majid
Tulane University

Hidezo Mori
Tokai University

Juraj Okolicany
University of Tennessee, Memphis

Jean-Francois Pittet
San Francisco General Hospital

Joachim Roth
University of Giessen

Chikako Saiki
McGill University

Sanai Sato
National Eye Institute, NIH

Robert F. Schmidt
Physiologisches Institute, Wurzburg

Florian J. Schweigert
University of Leipzig

Gunnar Sedin
University Children's Hospital, Uppsala

Izumi Takasaki
Yokohama City University

Robert J. Unwin
Middlesex Hospital

Elvie M. Wintour-Coghlan
University of Melbourne

Affiliate

Paul R. Janus
University of Illinois, Chicago

Roberta I. Stapenhorst
Hawaii Pacific University

Student

Aaron P. Aaker
Kansas State University

Sean H. Adams
University of Illinois, Urbana

Curtis W. Anderson
Northern Arizona University

Thomas L. Bauer
Thomas Jefferson University

Paul R. Below
University of Texas at Austin

James E. Blevins
Creighton University

Judy Boyd-White
Indiana University

Kori L. Brewer
East Carolina University

Cindy I. Buchanan
Northeastern University

John W. Castellani
University of Connecticut

Michael D. Conkright
Purdue University

David M. Conway
Oklahoma State University

Deanna L. Denault
Dartmouth Medical School

Jeffrey L. Emery
University of California, San Diego

Michael J. Emery
University of Washington

Susan L. Evans
University of Colorado

Amy Ewen
University of Missouri

Li Fan
McGill University

William Farquhar
Pennsylvania State University

Jefferson C. Frisbee
University of Guelph

Valerie K. Gann
University of Missouri

Marena D. Gatewood-Brown
Georgia Institute of Technology

Martin J. Gibala
University of Guelph

Kish L. Golden
Wayne State University

Dominika A. Grodzicka
Emory University

Craig A. Harms
University of Wisconsin

Rowshanak Hashemiyoon
Hahnemann University

Amanda Hayward-Lester
Texas Tech University

Minnie Q. Holmes-McNary
University of Illinois, Urbana

Suzanne Homan
University of Iowa

Kun-Lun Huang
University of Hawaii, Manoa

Rachel Ann Hunt
University of Alabama, Birmingham

Victor Hurst, IV
Albany Medical College

David Julian
University of California,
San Francisco

Mayumi Kajimura
University of California, Davis

Teri J. Kleine
University of Texas, Galveston

Smadar A. Lapidot
Johns Hopkins University

Shenggang Li
University of Tennessee

J. Russell Linderman
West Virginia University

Adel M. Malek
Harvard Medical School

Chanin P. McClurkin
Medical University of South Carolina

Kevin J. McDonnell
Georgetown University

Bryan D. Moyer
Dartmouth Medical School

Kenneth K. Nakada
University of California, Los Angeles

Geoffrey P. Nase
West Virginia University

Brett Palmer
Tennessee State University

Christopher M. Penland
East Carolina University

Dagogo J. Pepple
University of the West Indies

Angela M. Peterson
Meharry Medical College

Cynthia E. Port
Albany Medical College

Stacie M. Propst
University of Alabama, Birmingham

Changbin Qiu
West Virginia University

Ilie Racotta
Escuela Nacional de Ciencias
Biol, IPN

Rolando J.J. Ramirez
West Virginia University

Stuart P. Richer
FUHS/Chicago Medical School

Mark J. Rieder
Medical College of Wisconsin

Patricia M. Rivera
University of Alaska

Rolando E. Rumbaut
University of Missouri

Todd Samelman
Ohio State University

Max G. Sanderford
University of Texas, San Antonio

John P. Skvorak
University of South Florida

Hilary K. Srere
University of Colorado

Brian L. Stauffer
Pennsylvania State University

David E. Stec
Medical College of Wisconsin

Curtis B. Thompson
University of Southern California

Stephanie A. Trelogan
University of Colorado

Carrie B. Waters
University of Missouri

Gregory B. Waypa
Albany Medical College

Sarah A. Wilcox
Albany Medical College

Pamela Anne Wilkins
Cornell University

Erika B. Wiltenmuth
Northern Arizona University

Xin Xiao
University of Alberta

Meetings

Experimental Biology '95
Atlanta, GA April 9–13, 1995

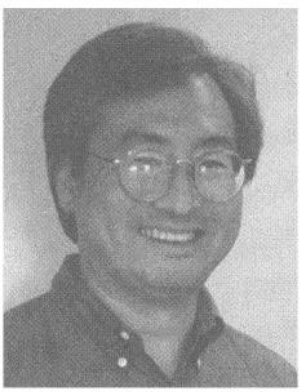
APS Distinguished Lectureships

HENRY PICKERING BOWDITCH LECTURE

Barbara Block,
Stanford University

"Regulation of Calcium Release in Muscle: The Role of the Ryanodine Receptor in Contraction and Thermogenesis"

PHYSIOLOGY IN PERSPECTIVE: WALTER B. CANNON MEMORIAL LECTURE
(supported by The Grass Foundation)



Kenneth Chien,
University of California, San Diego

"Cardiac Muscle Diseases in Genetically Engineered Mice: The Evolution of Molecular Physiology"

Cardiovascular Section

ROBERT M. BERNE DISTINGUISHED LECTURE

Harris J. Granger,
Texas A & M University

"Regulation of Coronary Angiogenesis"

Cell & General Physiology Section

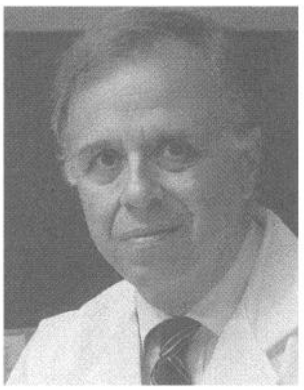
HUGH DAVSON DISTINGUISHED LECTURE

Michael J. Berridge,
University of Cambridge

"Spatiotemporal Aspects of Calcium Signalling"

Central Nervous System Section

JOSEPH ERLANGER DISTINGUISHED LECTURE

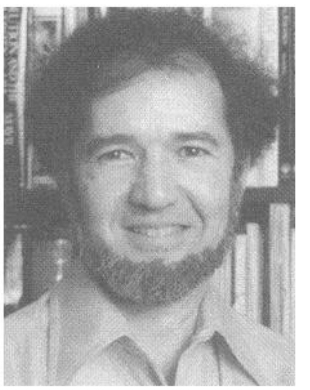


Donald J. Reis, Cornell University Medical Center

"Central Neural Mechanisms That Protect the Brain From Hypoxia and Ischemia"

Comparative Physiology Section

AUGUST KROGH DISTINGUISHED LECTURE

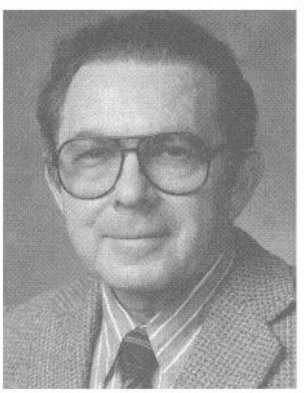


Jared M. Diamond, University of California, Los Angeles

"Quantitative Evolutionary Design of Physiological Systems"

Endocrinology & Metabolism Section

SOLOMON A. BERSON DISTINGUISHED LECTURE

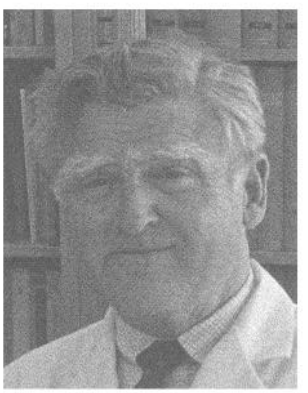


Mladen Vranic, University of Toronto

"The Yin-Yang of Carbohydrate Metabolism"

Environmental & Exercise Physiology Section

EDWARD F. ADOLPH DISTINGUISHED LECTURE

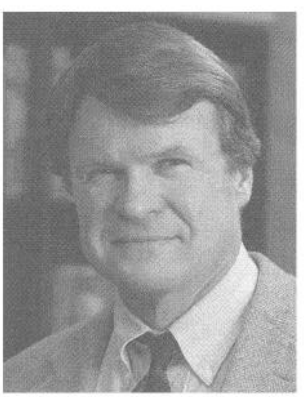


Loring B. Rowell, University of Washington

"How Are Neural and Mechanical Effects on the Circulation Balanced During Exercise?"

Gastrointestinal Section

HORACE W. DAVENPORT DISTINGUISHED LECTURE

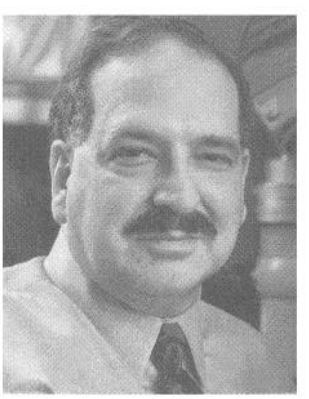


Leonard R. Johnson, University of Tennessee

"Regulation of Gastrointestinal Mucosal Growth"

Neural Control & Autonomic Regulation Section

CARL LUDWIG DISTINGUISHED LECTURE

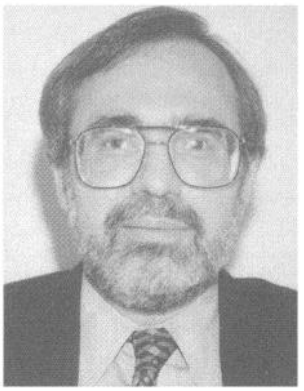


Arthur D. Loewy, Washington University

"From Smokedrums to Viral Tracing: 150 Years of CNS Autonomic Research"

Renal Physiology Section

CARL W. GOTTSCHALK DISTINGUISHED LECTURE

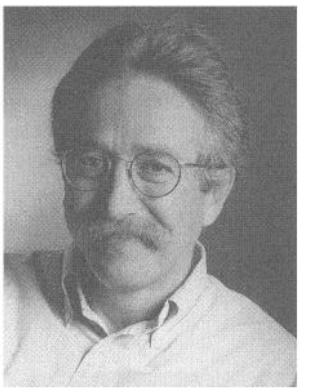


Steven C. Hebert, Harvard University

"The Na-Cl/Na-K-Cl Gene Family: Recent Advances in Our Understanding of the Biology of the Na-Cl-Coupled Cotransporters"

Respiration Section

JULIUS H. COMROE, JR. DISTINGUISHED LECTURE

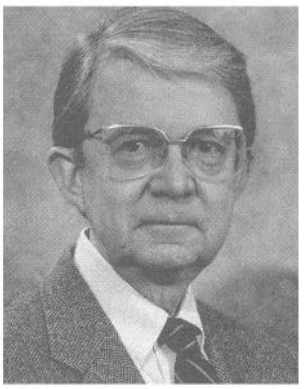


Jack Feldman, University of California, Los Angeles

"From Molecules to Synapses to Networks to Breathing"

Teaching of Physiology Section

CLAUDE BERNARD DISTINGUISHED LECTURE



Howard Barrows, Southern Illinois University

"Problem-Based Learning: Rationale and Design"

Water & Electrolyte Homeostasis Section

DISTINGUISHED LECTURE

Pierre Corvol, College of France, Paris

"Gene Variants of the Renin-Angiotensin-Aldosterone System: Implications in Cardiovascular and Renal Homeostasis in Humans"

Experimental Biology '95

Deadlines

Abstracts – December 1, 1994

Advance Registration – February 24, 1995

Housing Reservations – March 3, 1995

News From Senior Physiologists

Letters to Carl Gottschalk

Ernest Foulkes, at the University of Cincinnati Medical Center, OH, reports "I am about to turn 70, remain in good health, and even still enjoy crawling around caves occasionally with my grandchildren. My research support unfortunately has dwindled, and I have become more involved in educational administration, writing, and editorial work. It is along those lines that I hope to remain occupied once I retire. I also plan, at that time, to take formal course work in subjects like History for which I never could find adequate room in my schedule. Occasionally in my teaching I attempt to sneak in some historical background. The need for this is great: a class of residents recently claimed never to have heard of Claude Bernard or Walter Cannon! My disappointment here represents more than the proverbial shaking of one's head over what the world is coming to. I do not consider accumulation of facts outside of any context to be good education."

Malcolm Holliday says that "it is fair to say that I am an outlyer among members, having been involved primarily in clinical activities, and wondered who would be interested in my activities. However, my membership was a help in maintaining a perspective that physiological principles were important in devising clinical strategies. As I have thought about your letter I wondered if it would be useful to have a clinical physiology section or a group relating physiology to clinical problems. My own feeling at this time is that academic clinicians are trying desperately to mimic cell biologists and have little sense of what a few of us call whole body, integrative, or clinical physiology. Intensive care medicine, which I practiced and then watched as it got formalized, needed, and still needs, a healthy dose of integrative physiology. Having made that statement, I will now make a suggestion that developmental human physiology be given a more visible place in the discipline of physiology.

"My wife and I retired two years ago to the Inverness/Point Reyes area in West Martin, on the edge of the Point Reyes National Seashore (Park). I am quite involved with the local nonprofit health clinic as a member of the Board of Directors (not as a pediatrician) as it struggles to adapt to the changing environment. I also have interested myself, peripherally, in the national debate by advocating a better developed evaluation system for what we do to patients.

"Except for peddling my method for doing GFRs (KI:41,1701) and writing and occasional piece, I closed my pediatric nephrology career by editing *Pediatric Nephrology,* a 9 pound-5 ounce text that was good to have done but was not always fun to do. I have gotten interested in the history of fluid therapy. I'm planning to do a short history on the evolution of fluid therapy, focusing on the times of Gamble, Darrow, and Butler."

William Ganong writes "thank you for your recent note. I hadn't realized that I qualified for your group, even though I am a member of the Class of 1924. I took early retirement ("the golden handshake") on July 1, 1991, but was then recalled for 2 years. I formally retired July 1, 1993. However, this does not seem to make much difference in what I do. *Review of Medical Physiology* still comes out every 2 years, and I am currently working on the 17th edition. Also, I continue as Coeditor-in-Chief with Luciano Martini (in Milan, Italy) of a quarterly review journal, *Frontiers in Neuroendocrinology,* which is now published by Academic Press. I am still active in APS activities as a member of the Handbook Subcommittee of the Publications Committee, and I just accepted a job as Associate Editor of the new Journal of Molecular Medicine. Finally, I have one additional duty: I am the Recording Secretary of the UCSF Emeritus Faculty Association."

Public Affairs

DOD Research Criticized

DOD animal research came in for criticism in the report language that accompanied the DOD reauthorization bill. The House Armed Services Committee report called on the Secretary of Defense to release more information about its animal research programs and activities, edited for public disclosure as necessary. The committee directed DOD to select as the community members of its Institutional Animal Care and Use Committees (IACUC) "animal advocates, i.e., persons who have a demonstrated commitment to animal welfare and protection." The report also called on the Secretary to "establish aggressive programs to replace, reduce and refine current uses of animals."

This report language echoed the outlines of testimony presented by Physicians Committee for Responsible Medicine Chairman Neal Barnard at an April 13, 1994, hearing on DOD animal research. That hearing was held to review reports requested by Congress after initial hearings on the subject were held in 1992.

Report language does not carry the same weight as statutory language in the bill itself; however, it is considered binding unless contradicted by other report or conference language. In this case, the House language was superseded because it was omitted from the conference report. Nevertheless, this issue is likely to resurface next year with the Torricelli bill (see Torricelli article below) as its vehicle.

Torricelli Backs Expanded Animal Reporting; Lantos Seeks to Replace Animal Tests

On August 16, 1994, Rep. Robert Torricelli (D-NJ) introduced the Animal Experimentation Right to Know Act (HR 4971). This bill would amend the Animal Welfare Act by requiring USDA to collect additional information about animals used in research, testing, and education and to make such information more readily available to the public. The bill would also require the Secretary of Defense to submit an annual report to Congress on DOD animal research programs including "in-depth profiles of animal research" at each facility. The Secretary would also have to establish programs to "phase out and replace current uses of animals at [DOD] research facilities" and to appoint ombudsmen at each facility to investigate complaints and concerns about animal care.

The 103rd Congress adjourned before any action could be taken on the Torricelli bill, but it will most likely be reintroduced in the 104th Congress.

Shortly before Congress adjourned, Rep. Tom Lantos (D-CA) introduced a bill that would require federal agencies responsible for product safety testing to evaluate nonanimal acute toxicity tests every two years to determine whether such tests can be substituted for the Draize test and other whole animal acute toxicity tests. This legislation is also expected to be reintroduced in the 104th Congress.

Farm Animal Regulations Due

USDA is expected to issue regulations soon concerning the use of farm animals in biomedical research. A series of public hearings has been held during the past year to explore issues and concerns.

Although USDA currently has no formal guidelines for the care of farm animals, biomedical research facilities generally use natural settings as recommended in the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*. One area of possible concern is what kind of care settings the new regulations will require for farm animals used in biomedical research.

NCRR Survey of Laboratory Animal Use

The National Center for Research Resources (NCRR) at NIH has been given the go-ahead by the Office of Management and Budget to conduct its first nationwide survey of lab animal use in 15 years. Forms will be sent to the more than 1,000 organizations that have Animal Welfare Assurances on file with NIH's Office of Protection from Research Risks.

The survey will retrospectively cover the period from October 1, 1992, through September 30, 1993, and will be conducted anonymously to maintain confidentiality. The data requested will include numbers of animals by species, gender, and source; purposes for which the animals were made available; status of animal facilities and resources; and anticipated needs to maintain compliance with the various laws, regulations, guidelines, and policies governing the use of animals in research.

Library Campaign Seeks Books

The American Friendship Library Project (AFLP) of Richmond, VA, is collecting books to ship to Russia. The organization welcomes donations of new or used hardback or paperback books and scientific journals on a wide variety of topics. Books should be in good condition and no more than 10 years old, in current use in their field, or of enduring value. Books can be shipped to AFLP at PO Box 160, Richmond, VA 23208. *Further information:* Executive Director Jeffrey Gallagher, 1502 Avondale Ave., Richmond, VA 23227. Tel: (804) 261-6852; e-mail: JGALL@CABELL.VCU.EDU.

Now Appearing on the APS "Gopher" Information Server:

APStracts

an on-line publication of the abstracts of manuscripts accepted for publication in all APS journals as of January 1995.

FY 1994 and 1995 Appropriations Levels for Selected Biomedical Research Funding Agencies

Agency	FY 1994, millions of dollars	FY 1995 Request, millions of dollars	FY 1995 Final Level, millions of dollars	Change from FY 1994 to FY 1995, %
NIH	10,937.7	11,471.9	11,334.1	+3.6
VA Medical and Prosthetic Research	252.0	211.0	252.0	0
NSF Research and Related Activities	2,163.7	2,348.7	2,280.0	+11.4
USDA APHIS Animal Welfare Act Enforcement	9.3	9.3	9.3	0

The American Physiological Society NetAlert

The American Physiological Society is establishing a quick-response network to let physiologists know when Congress and the Administration are dealing with critical topics such as the use of animals in research or biomedical research funding. When these issues are pending, APS NetAlert members will be provided with background information to help you make your views known.

To join the APS NetAlert, please return this form to Alice Hellerstein at the address below. Be sure to provide your home zip code, e-mail address, and fax number. You can also get this form electronically from netalert@aps.mhs.compuserve.com.

First Name: _____ Last Name: _____

University/Institution: _____

Address: _____

_____

City, State: _____ Zip Code: _____

Phone: _____

My areas of interest are:

☐ **Animals:** Legislation, regulations, and court actions that affect the use of animals in research
☐ **Funding:** Federal funding for NIH and other research agencies
☐ **Issues:** Federal policies on issues such as indirect costs, scientific misconduct, conflict of interest, etc.

Important information:

Home Zip Code: _____ **E-mail address:** _____

☐ **Internet** ☐ **Bitnet** ☐ **Compuserve** ☐ **MCIMail** ☐ **Other** _____

Fax number: _____

Contact: Alice Hellerstein • APS Public Affairs Officer
9650 Rockville Pike • Bethesda, MD 20814-3991
Telephone: (301) 530-7105 • Fax: (301) 571-8305
E-mail: netalert@aps.mhs.compuserve.com

ALF Fugitive Coronado Apprehended

Self-proclaimed animal activist Rodney Coronado was arrested near Tucson, AZ, on September 28, 1994. Coronado was wanted by federal authorities since his July 1993 indictment by a Michigan grand jury in connection with his role in a 1992 arson attack at Michigan State University. That attack, which the Animal Liberation Front (ALF) claimed, caused $200,000 in damages and destroyed two scientists' research data. Richard Aulerich lost 32 years of data on minks, and Karen Chou lost 10 years of data on the effects of chemicals on animal reproduction.

According to Michigan State University Deputy Chief of Police Jim Dunlap, federal authorities got an anonymous tip that Coronado was hiding at the Pascua-Yaqui Reservation near Tucson. Agents of the federal Bureau of Alcohol, Tobacco, and Firearms sought to arrest him there and succeeded after what was described as a brief scuffle. People for the Ethical Treatment of Animals cofounder and national chair Ingrid Newkirk expressed regret at Coronado's apprehension. "I am so sorry they picked him up," Newkirk told the Michigan State University's *State News*.

As of press time, Coronado was being held in federal custody in Arizona pending the outcome of an extradition hearing. According to information released by Coronado supporters, he has told his court-appointed attorneys that he considers the case against him to be political. Coronado is also a suspect in other ALF raids that took place in 1991 and 1992 involving four universities, a mink food-processing operation, and a defunct mink farm.

American Physiological Society Resource Sheet

Some Hints for Talking to Your Friends and Neighbors About Animal Research

Scientists who use animal models in their work may sometimes encounter friends, neighbors, or even colleagues who are dubious about the value of such work. The best way to deal with questioners who are skeptical rather than hostile is to be open with them and to find some simple ways to explain the importance of animal research.

Be prepared even for chance encounters. Anticipate questions based upon stories that have been in the newspaper, on television, or in the movies, and decide in advance how best to respond to the issues. If an incident occurred locally, get all the facts. Acknowledge the existence of problems, but don't be defensive or get bogged down in past mistakes. Refocus the discussion on something positive. (This is particularly important if there is one hostile questioner in a group that is generally neutral. The goal is to reach the audience, not the debater.)

Most questions about animal research are rooted in a few common concerns. Draw upon your own research or your personal experience to respond to these issues. Anecdotes reach people more effectively than a recitation of facts or statistics. For most people, the burning issues are:

Is animal research necessary? *Yes, animal research is necessary for medical progress that saves human and animal lives.*

Why do you have to use cats/dogs/bunnies/monkeys? *Actually, most research uses rats, mice, and other rodents. Those other animals — for which many people have a special fondness — are used only rarely, and mostly to learn about some of the most important medical problems. They are seen far more often in activists' literature than they are in laboratories.*

Are the animals well cared for? *All laboratory animals receive excellent care and are humanely treated, with particular effort to minimize distress. This is important for humane as well as scientific reasons, since a well-cared for animal will provide more valid results. Federally funded research is subject to mandatory regulations and guidelines, but many research facilities also voluntarily apply even more stringent standards.*

Here are some more communications tips:

- Present your ideas in a logical progression that are easy to follow.
- Use short sentences and short words.
- Avoid too many statistics. One or two numbers are plenty!
- Humor can backfire when a subject is emotionally charged. Don't try to be funny.
- Don't try to bluff when you don't know. If it's important, offer to find out the facts.
- Correct factual errors or false assumptions that underlie questions.
- Keep it in context. Don't forget that you are having a conversation.

This fact sheet is based upon materials presented by Beth Waters and Michael Mills at a June 3, 1994, workshop sponsored by the Pennsylvania Society for Biomedical Research.

NIGMS Reorganizes, Moves to Natcher Building

The NIGMS has undergone a reorganization and a move to the new William H. Natcher Building on the main NIH campus. The reorganization is designed to enhance the Institute's effectiveness and efficiency in supporting basic biomedical research and research training as well as to align its organizational structure and position titles with those of other NIH institutes.

The most significant change is the rearrangement of four program branches—Cellular and Molecular Basis of Disease, Genetics, Biophysics and Physiological Sciences, and Pharmacology and Biorelated Chemistry—into three divisions: Cell Biology and Biophysics; Genetics and Developmental Biology; and Pharmacology, Physiology, and Biological Chemistry. Two other Institute components have also become divisions: the Division of Minority Opportunities in Research and the Division of Extramural Activities.

According to Marvin Cassman, acting director of NIGMS, "The reorganization reflects the increasingly interdisciplinary nature of the research funded by NIGMS. By refining the distribution and balance of scientific areas among the divisions, we will improve the Institute's ability to promote and support the most innovative basic research of the future."

Other changes involve modifications of organizational names and the movement of several administrative offices to more appropriate organizational levels. A summary of the research areas covered by the NIGMS divisions, along with the Institute's revised structure, is given below.

"The reorganization corresponds to the policy objectives of the Clinton Administration's National Performance Review by streamlining and 'delayering' the Institute and by increasing supervisory to staff ratio. The new organization is not intended to reflect changes in NIGMS support for specific areas of science," Cassman notes. "In fact, the grant portfolios managed by individual program administrators will remain essentially the same."

The move to the Natcher Building brings the entire NIGMS staff to the NIH campus for the first time in more than 30 years. All mail to NIGMS staff should now be addressed as follows:

(Name of staff member)
NIGMS, NIH
45 Center Drive MSC 6200
Bethesda, MD 20892-6200

NIGMS telephone and fax numbers are changing as well. Call the old number to hear a recording giving the new number, or call the NIGMS Office of Research Reports at (301) 496-7301 to find out an employee's new telephone number.

Major Scientific Areas Supported by NIGMS Divisions

Division of Cell Biology and Biophysics
- Analytical and separation techniques
- Bioengineering
- Biomedical instrumentation
- Cell organization, motility, and division
- Lipid biochemistry
- Membrane structure and function
- Molecular biophysics
- Spectroscopic techniques
- Structural biology

Division of Genetics and Developmental Biology
- Cell growth and differentiation
- Chromosomal organization and mechanics
- Control of gene expression
- Developmental genetics and cell biology
- Extrachromosomal inheritance
- Human medical genetics
- Mechanisms of mutagenesis
- Molecular immunobiology
- Neurogenetics and the genetics of behavior
- Population genetics
- Replication, recombination, and repair of genes

Division of Minority Opportunities in Research
- Minority Access to Research Careers Branch
- Minority Biomedical Research Support Branch
- Bridges to the Future
- Predoctoral Fellowship Awards for Minority Students

Division of Pharmacology, Physiology, and Biological Chemistry
- Anesthesiology
- Biochemistry
- Bioenergetics
- Bio-organic and bio-inorganic chemistry
- Biotechnology
- Glycoconjugates
- Medicinal chemistry
- Pharmacology
- Physiology
- Synthetic chemistry
- Trauma and burn injury

Office for Protection From Research Risks Workshops

The NIH Office for Protection from Research Risks is continuing to sponsor workshops on implementing the Public Health Service Policy on Humane Care and Use of Laboratory Animals. Each of the workshops scheduled for FY 1994 and 1995 will focus on a specific theme. The workshops are open to institutional administrators, members of IACUCs, laboratory animal veterinarians, investigators, and other institutional staff who have responsibility for high-quality management of sound institutional animal care and use programs. Ample opportunities will be provided to exchange ideas and interests through question and answer sessions and informal discussions.

Considerations for Use of Wild Vertebrates in Research
January 12–13, 1995

Location:
Westward Look Resort
245 Ina Road
Tucson, AZ 85704
Tel: 602-297-1151 or
1-800-722-2500
Fax: 602-297-9023

Sponsors:
Northern Arizona University,
University of Arizona Health Science Center

Registration:
Dr. Terry May
Director of Research Administration
Northern Arizona University
PO Box 4130
Flagstaff, AZ 86011-4130
Tel: 602-523-6788
Fax: 602-523-1075
E-mail: tam1@nauvax.ucc.nau.edu

Dr. Susan Sanders, Director
University of Arizona Animal Care
2205 E. Speedway Boulevard
Tucson, AZ 85719
Tel: 602-621-3454
Fax: 602-621-3355

Fee: $175 for full workshop; $70 for daily registration as space available

This workshop will focus on three general themes related to the inclusion of native vertebrates in research: (1) Federal and institutional policies and procedures as they relate to the responsibilities of the IACUC in considering research on both captive and free-living wild vertebrates, (2) standards for the husbandry and housing of captive wild vertebrates, and (3) occupational health considerations with an emphasis on rodent-borne hantavirus.

Animal Care and Research: Challenges and Changes for the Institutional Animal Care and Use Committee
March 12-14, 1995

Location:
San Diego Princess
1404 West Vacation Road
San Diego, CA 92109-7994
Tel: 619-274-4630 or
1-800-344-2626
Fax: 619-581-5929

Sponsors:
Tufts University School of Veterinary Medicine, Public Responsibility in Medicine and Research

Registration:
Ms. Danielle Demko
Public Responsibility in Medicine and Research
132 Boylston Street
Boston, MA 02116
Tel: 617-423-4112
Fax: 617-423-1185

Fee: $300

The Workshop will focus on revisions to the IACUC Guidebook, assessment and reduction of pain and distress in animal research, occupational health risks and biohazards, and a host of other regulatory and administrative issues that are central to the successful operation of laboratory animal care and research programs.

Immediately preceding the Tufts University School of Veterinary Medicine/NIH Office for Protection from Research Risks Workshop, Applied Research Ethics National Association will sponsor its annual animal issues meeting on Sunday, March 12, also at the San Diego Princess.

For further information concerning these workshops and future NIH Office for Protection from Research Risks Animal Welfare Education Workshops, contact:

Mrs. Roberta Sonneborn
Office for Protection from Research Risks
National Institutes of Health
Building 31, Room 5B63
Bethesda, MD 20892-2180
Tel: 301-496-7163
Fax: 301-402-2803

Introducing... Ethan Nadel

On January 1, 1995, **Ethan Nadel** will succeed **Heinz Valtin** as chair of the APS Program and Program Advisory Committees. Major changes in APS programming in recent years have included the reorganization of the spring meeting and the establishment of APS Conferences. Nadel will attempt to continue the successes of recent years and wishes to draw members who have not been attending APS meetings back into the fold by establishing new program events in areas related to their interests. His goal is to establish the APS meetings as the most exciting meetings for all APS members. By establishing these as integrative biology meetings with program events including cellular, molecular, and organ system approaches to control and regulation, the appeal to the membership will be enhanced considerably. Program issues will be among the topics discussed at the fall 1994 APS Retreat.

Nadel is the director of the John B. Pierce Laboratory in New Haven, CT, and a professor of epidemiology (environmental health) and cellular & molecular physiology at the Yale University School of Medicine. He is a graduate of Williams College and the University of California, Santa Barbara, where he received his PhD in biological sciences in 1969 under the tutelage of Steven M. Horvath. Nadel's research, supported by the NIH for more than two decades, uses gravitational stress, exercise, acute manipulation of blood volume, and dehydration, independently and in combination, as experimental tools to understand the reflexes involved in blood volume regulation. His studies characterizing the mechanisms underlying plasma albumin fluxes following hemorrhage in small animals and exercise in humans are helping to explain the means by which blood volume expansion occurs, his studies on changes in the control of fluid intake and of renal electrolyte clearance after dehydration are elucidating the basic mechanisms enabling body fluid homeostasis in younger and in older people, and his work on characterizing the cardiopulmonary baroreflex is clarifying the importance of the 'anticipatory' limb of arterial blood pressure regulation and its involvement in body fluid regulation.

Nadel is currently leading a multidisciplinary team of scientists studying the aging process at a private retirement community in Southbury, CT, in a five-year project sponsored by the National Institute on Aging.

In 1988, Nadel was part of a collaborative effort of scientists and engineers that developed a 68-lb. human-powered aircraft that set the world record for human-powered flight, covering 74 miles in four hours between the Greek islands of Crete and Santorini. Nadel's prior research on the control of energy fluxes and the regulatory systems involved in resisting dehydration and excessive hyperthermia was essential to the success of this renowned project.

Nadel is the author of 130 publications and has edited three books. His publications include two *American Scientist* articles frequently cited by colleagues as models for teaching graduate students. He has been an active member of APS since 1972, having served on the editorial board of the *Journal of Applied Physiology* from 1979 to 1989; as Councilor (1985-1987), Program Advisory Committee representative (1987-1990), and Chair (1990-1994) of the Environmental & Exercise Physiology Section; and as a member of the Long Range Planning (1987-1990) and Program (1991-present) Committees. He was a member of the Environmental Physiology Commission of the International Union of Physiological Sciences from 1977-1986 and has served on committees of the National Academy of Sciences and the American College of Sports Medicine. He currently serves as a member of the NIH Respiratory and Applied Physiology Study Section. He has served on advisory boards such as the External Advisory Committee of the August Krogh Institute and has been named to present numerous lectureships, including the Harry G. Armstrong Lecture at the Aerospace Medical Association in 1991.

Nadel invites all APS members to participate fully in the programming of our meetings, as meetings are the single forum for exchange of current information and generation of new ideas.

John A. Clements Wins Lasker Award

The 1994 Lasker Award for Clinical Medical Research was given to **John A. Clements**. Clements was cited for his discovery of lung surfactant and subsequent work to synthesize an artificial version of this substance, which is credited with saving the lives of thousands of premature infants.

Clements was educated at Cornell University, where he received his MD from the Medical College in 1947. He spent the next two years there as a research assistant in the Department of

Physiology before coming to the Clinical Research Division of the US Army Chemical Center in Edgewood, MD, in 1949. He served there first in the Clinical Investigation Branch and then as Acting Chief, Assistant Chief, and Acting Deputy Chief of the Clinical Research Division over the next 12 years. During this period he was also a research associate in physiology and pharmacology at the University of Pennsylvania Graduate School of Medicine; an exchange scientist with the Chemical Defence Experimental Establishment in Porton, UK; and a lecturer with the Department of Anesthesiology at Johns Hopkins University. Clements went to the University of California School of Medicine in San Francisco in 1961, where he now holds appointments as the Julius H. Comroe, Jr., Professor of Pulmonary Biology and as Associate Director for Research in the Pulmonary Division of the Department of Pediatrics. Clements is Director of the Lung Metabolism and Surface Tension Laboratories and a Career Investigator of the American Heart Association. In addition, he has been principal investigator on 21 NIH research grants over the course of the past 20 years.

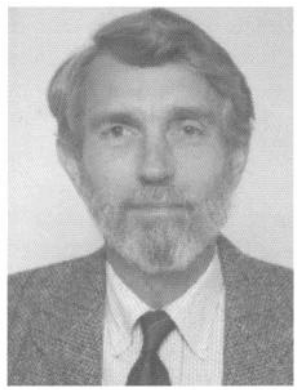
Clements joined the APS in 1958 and has served on the editorial boards of several APS journals, most recently as associate editor of the *AJP: Lung Cellular and Molecular Physiology* from 1988 to 1994. In 1961, Clements was the Sixth APS Bowditch Lecturer and spoke on "Surface Phenomena in Relation to Pulmonary Function."

Zach W. Hall Named NINDS Director

Harold Varmus, Director of the NIH, announced his appointment of **Zach W. Hall** as the new director of the National Institute of Neurological Disorders and Stroke (NINDS), the leading federal agency for research on disorders of the brain and nervous system. Hall is currently the Lange Professor and Chair of the Department of Physiology at the University of California, San Francisco (UCSF), where he also holds the position of Head of the Biomedical Sciences Graduate Program.

"I am extremely pleased that someone of Dr. Hall's standing in the neuroscience community has agreed to assume leadership of the NINDS," said Varmus. "His credentials as a scientist and his experience as an academic administrator who has established one of the nation's premier neuroscience programs will be invaluable in this era of rapid discovery in the basic and clinical neurological sciences."

As director of NINDS, Hall will oversee a staff of some 700 scientists,



physician-scientists, and administrators and an annual budget of more than $630 million. NINDS supports research by investigators in public and private institutions across the country as well as by scientists working in 23 intramural Institute branches and laboratories in areas ranging from the structure and function of single brain cells to tests of new diagnostic tools and treatments for those with neurological diseases. The Institute has been at the forefront of brain research since 1950 and is a lead agency in the Congressionally designated Decade of the Brain.

"More than 50 million Americans suffer from neurological disorders," said Philip R. Lee, Assistant Secretary for Health and Director of the Public Health Service, in endorsing Varmus' selection. "I look forward to Dr. Hall's leadership of our national effort to fund critical biomedical research that will result in improved care and treatment of patients with these disorders."

"This is an exciting time to take over the leadership of the NINDS," according to Hall. "The next decade will see continuous progress in our understanding of how the nervous system works as well as increasing application of advances in basic neuroscience to the diagnosis, treatment, and prevention of neurological disorders. The mission of NINDS during this remarkable time will be to provide the scientific leadership and institutional support to sustain these advances."

Hall was identified as a top candidate for NINDS by a committee of distinguished consultants after an extensive national search. In recommending Hall to Varmus, the committee cited his role in establishing one of the nation's leading programs in neuroscience research and graduate training at UCSF. Within his own area of interest, Hall has made fundamental contributions to the investigation of the neuromuscular junction. He is the author and editor of *An Introduction to Molecular Neurobiology,* a widely used textbook, and has published more than 100 original papers and reviews in scientific journals. He is also a founding editor of *Neuron,* a leading journal of cellular and molecular neurobiology.

Hall's numerous professional activities include membership on the Scientific Advisory Committee for Neurobiology of the Howard Hughes Medical Institute and participation in the Dana Alliance for Brain Initiatives. He is a member of APS, the Society for Neuroscience, and the American Association for the Advancement of Science, among other professional scientific groups.

Hall was recently elected a Fellow of the American Academy of Arts and

Sciences and has received many honors in his field, including being named the 1994 Alexander Forbes Lecturer at the Marine Biological Laboratory in Woods Hole, MA. He has twice won the prestigious Jacob Javits Neuroscience Investigator Award, a seven-year grant awarded by NINDS to distinguished investigators who have a record of substantial contributions at the cutting edge of neurological science.

Hall received his undergraduate degree in English from Yale University in 1958 and his PhD in Biochemistry (Medical Sciences) from Harvard University in 1966. From 1966 until 1968, he was a fellow in biochemistry at Stanford University School of Medicine. From 1968 until moving to UCSF in 1976 as professor of physiology and head of the new neuroscience program, he was on the faculty of the Harvard Medical School Department of Neurobiology.

People and Places

Paul S. Matsumoto has accepted a position with Children's Hospital Research Institute in Oakland, CA. Prior to this position, Matsumoto was with the Department of Physiology and Biophysics, University of Texas Medical Branch, Galveston.

Recently relocating from the Department of Medicine, University of Illinois, Chicago, **John L. Skosey** is now the Academic Director of Internal Medicine, Department of Education, MacNeal Hospital, Berwyn, IL.

Formerly with the Department of Exercise & Sport Science, Oregon State University, **Christian W. Zauner** is presently the Dean of Health and Human Performance at East Carolina University, Greenville, NC.

Neil Kizer relocated to Washington University School of Medicine, Renal Division, The Jewish Hospital of St. Louis, MO. Kizer was formerly associated with the Department of Physiology, Dartmouth Medical School, Hanover, NH.

Now with the South Carolina Governor's School, Hartsville, **Glenn McCombs** was formerly with the University of Kentucky College of Medicine, Lexington.

The new Professor and Chair of the Department of Biochemistry & Molecular Biology, Oregon Health Sciences University, Portland, is **Jack H. Kaplan,** who previously was with the Department of Physiology, University of Pennsylvania.

Harold T. Meryman, formerly with the Transplantation Laboratory, American Red Cross, Rockville, MD, has recently accepted a position with the Naval Medical Research Institute's Transfusion Medicine Research Program, Bethesda, MD.

Recently **Craig Michael Schramm** relocated to the Pediatric Pulmonary Division, University of Connecticut, Farmington. Schramm was formerly located at the Childrens Hospital, Philadelphia, PA.

Accepting a new position as Vice President Discovery Research of Monsanto Company, St. Louis, MO, **Peter B. Corr** recently moved from the Washington University Medical School, Cardiovascular Division, St. Louis, MO.

William J. Welch transferred to the Department of Medicine, Georgetown University Medical Center, Washington, DC. Prior to his new assignment, Welch was with the Department of Medicine, University of Gainesville, FL.

Formerly with the Department of Physiology & Biophysics, University of California, **Steven Swoap** has accepted a position with the Department of Internal Medicine, Division of Cardiology, University of Texas Southwestern, Dallas.

Corresponding Member **Kouichi Ohta,** previously affiliated with the Department of Neurology, Keio University School of Medicine, Japan, has recently accepted a position with the Max-Planck-Institut for Neurological Research, Lindenthal, Germany.

Returning from the University of Lund, Sweden, **Eliete Bouskeka** will be working in the Laboratory of Microcirculatory Research at the State University of Rio de Janeiro, Brazil.

Edward D. Miller has accepted a position in the Department of Anesthesiology and Critical Care, Johns Hopkins University, Baltimore, MD. Formerly, he was Chairman of the Department of Anesthesiology, Columbia University, New York, NY.

Moving from the Department of Molecular Pharmacology and Toxicology, University of Southern California, Los Angeles, **Michael Ming Shi** has joined the Harvard School of Public Health, Boston, MA.

Wolfgang F. Graier, originally from the Dalton Cardiovascular Research Center, University of Missouri, Columbia, has accepted an overseas position with the Department of Medical Biochemistry, University of Graz, Austria.

Transferring from the Department of Pediatrics, Washington University, St. Louis, MO, **V. Matti Vehaskari** has accepted a position with the Department of Pediatrics, Louisiana State University Medical Center, New Orleans.

Barbara A. Vance has moved from the Division of Nephrology, University of California, San Diego, to the National Cancer Institute, NIH, Bethesda, MD.

Currently with the Division of Science & Health, College of the Redwoods, Eureka, CA, **George D. Swanson** has moved from the Department of Physical Education, State University, Chico, CA.

Previously **Cynthia M. Handler** was with the Department of Pharmacology, Temple University School of Medicine, Philadelphia, PA. Handler has relocated to the Department of Biological Sciences, Barnard College, Columbia University, New York, NY.

Masaaki Shibata has moved from the Department of Physiology, University of Tennessee, Memphis, to the Department of Physiology, Yamanashi Medical College, Yamanashi, Japan.

Accepting a position at the Department of Health and Physical Education, Rowan College of New Jersey, Glassboro, **Jie Kang** has moved from the Human Energy Research Laboratory, University of Pittsburgh, PA.

Michael A. Statnick has accepted a position with Lilly Research Labs, Indianapolis, IN. Statnick was formerly with Southern Illinois University School of Medicine, Carbondale.

Having accepted a position at the Cardiovascular Research Institute, University of California, San Francisco, **Gavin Thurston** moved from the Department of Ophthalmology, University of British Columbia, Canada.

Donald J. Meyer has relocated to the Department of Anesthesiology, University of Missouri Hospital and Clinic, Columbia. Prior to his relocation, Meyer was with the Department of Anesthesiology, University of Rochester, Rochester, NY.

Recently, **Jerome B. Riebman** accepted a position with the Division of Cardiovascular Surgery, Santa Clara Valley Medical Center, San Jose, CA. Riebman left the Department of Surgery, Browns Mills, NJ.

Robert F. Rea has moved from the University of Iowa Hospital & Clinic, Iowa City, to the Mayo Clinic Scottsdale, Scottsdale, AZ.

Moving to the Hopkins Marine Station, Stanford University, CA, **John E. Keen** left the Department of Biology, Simon Fraser University, Burnaby, British Columbia, Canada.

Now situated in the Veterinary Physiology and Pharmacology Department of Texas A & M University, **Timothy A. Cudd** has left the Department of Physiology, University of Florida, Gainesville.

Ying Zhao has moved from the Department of Physiology, Indiana University School of Medicine, Indianapolis, IN, to the Department of Internal Medicine, University of Cincinnati, OH.

Know Your Sustaining Associates

Groupe de Recherche Servier

Of the 6,000 people working throughout the world at the Groupe de Recherche Servier, 25% carry out research involved in the development of new drugs. Among these, various specialist including chemists, pharmacists, pharmacologists, toxicologists, and physicians work in our research laboratories located in Suresnes, Croissy, Orléans, Gidy, Fulmer, and Tokyo and on our development teams in Courbevoie, Fulmer, Brussels, Munich, Rome, Madrid, and Tokyo.

The main axes of research at the Groupe de Recherche Servier concern the following areas of pathology; cardiovascular disease (especially in hypertension and myocardial ischemia), heart failure (cardiovascular aging and venous diseases), oncology and immunology, respiratory disease (chronic obstructive pulmonary diseases and asthma), metabolic disease (diabetes, lipid disorders, obesity, and their consequences particularly in terms of cardiovascular damage), neurological disease (cerebral impairment in the elderly and Parkinson's disease), cerebrovasular disease (memory impairment and Alzheimer's disease), psychiatric disease (emotional disorders, anxiety, and depression), and rheumatology (inflammatory and painful joint diseases and joint and bone aging including osteoporosis).

Procter & Gamble

Procter & Gamble is a multinational consumer products and health care company committed to world-class research and product development. It has major technical centers in Cincinnati, OH; Norwich, NY; Hunt Valley, MD; Mexico City, Mexico; Caracus, Venezuela; Brussels, Belgium; Egham and Newcastle, England; and Kobe, Japan.

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

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

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

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Professor and Chair of Physiology, School of Medicine and Biomedical Sciences, State University of New York at Buffalo. The successful candidate will have an internationally recognized record of achievement in research as well as a commitment to professional, graduate, and undergraduate training programs for students in health-related professions. Previous administrative experience is desirable. Candidates should have a PhD, MD, DVM, DDS, or equivalent degree. Salary, laboratory space, and other resources are negotiable. Women and minority applicants are particularly encouraged to apply. Interested persons should submit curricula vitarum, brief descriptions of research interests, and the names and addresses of three referees. All materials should be send to Dr. John Hay, Chairman, Physiology Chair Search Committee, School of Medicine and Biomedical Sciences, State University of New York at Buffalo, 138 Farber Hall, Buffalo, NY 14214. Deadline for receipt of application is January 31, 1995. [EOAAE]

Neurobiology. The Department of Biological Sciences at Western Michigan University seeks application for a tenure-track Assistant Professor position with expertise in cellular or molecular aspects of Neurobiology beginning fall 1995, pending budgetary approval. A PhD in a related field as well as postdoctoral training in neurobiology are required. The development of externally funded research in the department's doctoral program is expected. Preference will be given to candidates with research interests in developmental neurobiology, neurotoxicology, or signal transduction and to those with previous teaching experience. Teaching responsibilities will include an undergraduate course in human anatomy/physiology for nonbiology majors and graduate level courses in the area of expertise. Western Michigan University, a Carnegie Classification Doctoral I Institution, encourages applications from underrepresented groups. Send letter of application, vita, statement of research plans, and three letters of reference to Leonard C. Ginsberg, Chair, Department of Biological Sciences, Western Michigan University, Kalamazoo, MI 49008-3899. Fax: (616) 387-2489; Internet: leonard.ginsberg @wmich.edu. Review of applications will begin December 1, 1994, and applications will be accepted until the position is filled. [EOAAE]

Physiology and Biophysics Chair, Department of Physiology and Biophysics, University of South Florida College of Medicine. The Department has particular research strengths in organ systems and cellular physiology and participates in the education of MD and PhD students. Candidates for the position should have a PhD and/or MD, a strong record of original scholarship, demonstrated leadership ability, and a strong commitment to educational programs of the college and university. Applications are sought from scientists who will foster an integrative approach to physiology research. Interested individuals may submit a letter of application, curriculum vitae that includes a summary of current research, and the names and addresses of three references to Steven Specter, PhD, Department of Medical Microbiology and Immunology, University of South Florida College of Medicine, 12901 N. Bruce B. Downs Blvd., Tampa, FL 33612-4799. Tel: (813) 974-0897. Applications from women and underrepresented minorities are particularly encouraged. Candidates who need reasonable accommodation to participate in the interview process must notify Dr. Specter 48 hours in advance. The deadline for applications is December 31, 1994. [EOAAE]

Positions Available

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

A check or money order payable to the American Physiological Society must accompany the position listing. Purchase orders will not be accepted unless accompanied by payment. Ads not prepaid will not be printed. Copy must be typed double spaced and is limited to 150 words. All copy is subject to the editorial policy of *The Physiologist.* EOAAE indicates Equal Opportunity/Affirmative Action Employer and appears only when given on original copy. Copy deadline: copy must reach the APS office before the 15th of the month, two months preceding the month of issue (e.g., before February 15th for the April issue). Mail copy to APS, *The Physiologist,* 9650 Rockville Pike, Bethesda, MD 20814-39911.

Visual Representations of Speech Signals

Malcolm Cooke, Steve Beet, and Malcolm Crawford (Editors)
New York, NY: John Wiley & Sons, 1993, 385 pp., illus., index, $79.25. ISBN: 0-471-93537-9

Language is one of the evolutionary hallmarks of *Homo sapiens.* Virtually unique among human behaviors, there is no truly corresponding animal model for studying its physiological and anatomical bases. As a consequence, most of our knowledge pertaining to its neurological foundations has stemmed from the clinical literature, is fraught with ambiguity, and is therefore difficult to interpret. The advent of sophisticated computer-based imaging techniques, such as magnetic resonance imaging and positron emission tomography, is beginning to yield impressive results, but they lack the spatial and temporal resolution required to study the physiological responses of circumscribed neural populations.

However, the situation is not completely hopeless. For the past decade and a half a small coterie of researchers has painstakingly recorded the activity of single neurons from the mammalian (typically, cat) auditory pathway to speechlike signals under the assumption that general processing strategies are similar across species (e.g., *Journal of Phonetics* 16: 1-151, 1988). By necessity, experimental investigations have focused on the prephonetic stage of speech processing pertaining to spectral analysis and temporal segmentation. This research has recently become of interest to computer scientists and psychologists studying the neural mechanisms underlying speech understanding.

This interest in auditory processes is driven, in part, by pragmatic necessity. Computer-based speech recognition systems perform poorly when the acoustic environment changes. Speech recognition scores of 90% or better plummet when speech is embedded in a realistic (i.e., noisy) acoustic background (such as the proverbial cocktail party). Humans generally experience little difficulty understanding speech under such circumstances, so the question naturally arises as to how the auditory system deals with such adverse acoustic conditions.

The present volume brings together the work of more than 80 researchers (most of whom are computer scientists or electrical engineers) from Europe and North America presented at a conference sponsored by the European Speech Communication Association in April 1992. The meeting sought to compare various analytical and visualization techniques used to process and display speech. To make the results as comparable as possible, participants were asked to focus their presentations on four sentences provided by the organizers. These materials were intended to be representative of "real-world" conditions in which speech is spoken by different speakers, of separate gender, and under variable signal-to-noise ratios.

Why should the readership of *The Physiologist* take note of a volume squarely aimed at an audience immersed in the mathematical intricacies of speech analysis? The answer lies in the manner in which many of the participants applied physiological data to develop psychologically valid representations of the speech signal. *Visual Representations of Speech Signals* amply demonstrates the power and utility of the computational approach applied to the study of an important aspect of human behavior.

The book is divided into two parts. The first contains five tutorial-length chapters, each pertaining to an important topic in speech research. Subjects covered include pitch extraction, neural networks, time-frequency analysis, acoustic-articulatory interactions, and auditory models. The tutorial chapter of greatest interest to physiologists is "On the importance of time—a temporal representation of sound" by Slaney and Lyon. They provide a clear description of their nonlinear cochlear model, which produces a representation of neural activity distributed across the tonotopic axis of the auditory nerve. At some more central, anatomically unspecified location, these discharge patterns are processed by an autocorrelator, extracting information pertaining to both pitch and speech segment identity (timbre). Although focused on computational issues, Hermes' tutorial "Pitch analysis" provides a useful summary of recent auditory research on pitch. Recent innovations in signal processing techniques that circumvent the time-frequency trade-off characteristic of traditional spectral-analytic approaches are discussed in an important tutorial by Loughlin and colleagues.

The second, far lengthier, section consists of brief papers summarizing the thirty-six conference presentations. Traditionally, the sound spectrograph has been the analysis tool of choice among speech scientists. It produces a visual display, the spectrogram, which represents the complex spectra of speech as a series of amplitude-varying frequency channels as a function of time. Although the spectrogram provides a convenient means of visualizing the spectral structure of sound as a function of time it possesses certain drawbacks, such as a fixed analysis window duration and an essentially linear system response. It is now known that the auditory system is not characterized by such limitations, and as a result there is a growing conviction among speech scientists that many of the nonlinearities of auditory transduction are essential for suppressing background noise and tracking individual sound sources through time and space.

For this reason it is significant that nearly half of the studies described in this book utilize some form of auditory model. Most of these use a visual representation similar to that of the spectrogram, with the frequency dimension encoded as cochlear location. The temporal information contained in the auditory nerve is converted into a "place" representation at a more central level of the auditory pathway (e.g., the spiral periodicity detector of Patterson and colleagues). Many of the models assume that the frequency analysis of auditory nerve spike patterns is accomplished through some form of autocorrelation.

Perhaps the most interesting aspect of these auditory-based models concerns the strategies used to integrate the fine detail of neural firing patterns into representational forms commensurate with perceptually relevant analysis of these sounds. For example, Patterson and colleagues look for global patterns corresponding to acoustic "images." Cooke, Beet, and Crawford emphasize "synchrony strands" through which the auditory system constructs maps of related temporal activity through time as a means of grouping neural activity related to a coherent sound source. Their goal is to construct rules for mapping neural events onto the acoustic "objects" that produced them, similar to the approach pioneered by James Gibson and David Marr in vision and used by psychologists such as Albert Bregman and Chris Darwin in their studies of "auditory scene analysis."

Because so little is known about the physiology of speech processing in the upper reaches of the auditory pathway, this computa-

tional research can serve as a valuable point of departure for those interested in understanding the physiological mechanisms by which the fine-grained peripheral representation of sound is transformed into meaningful perceptual entities. *Visual Representations of Speech Signals* will prove a valuable reference for those seeking to apply computational methods to experimental and theoretical studies of acoustic processing in the auditory pathway.

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Thalamic Networks for Relay and Modulation

Diego Minciacchi, Marco Molinari, Giorgio Macchi, and Edward G. Jones (Editors)
Pergamon Studies in Neuroscience, No. 9. William Winslow (Series Editor)
Oxford, UK: Pergamon Press, 1993, 437 pp., illus., index, $135.00. ISBN: 0-080-42274-8

The thalamus is located at essentially the anatomical center of the brain, and although it cannot compete with the cortex in providing our perception and awareness, its position attests to its role in controlling many aspects of our behavior. All of our sensory systems are fully or partially routed through this brain region prior to reaching their neocortical destinations. Therefore, the thalamus is believed to play a pivotal role in gating or modulating neural signals going to the cerebral cortex. These actions and their anatomical bases are the subject of this book.

Thalamic Networks for Relay and Modulation is the third book that derives from symposiums held in Italy (the first in 1982 and the second in 1988) to bring neuroscientists together to discuss recent topics related to the thalamus. This volume was dedicated to Irving T. Diamond for his superb work in this field. Each of the research topics is presented as a chapter for a total of 36 chapters, and these are divided into four major areas. The first area is entitled "Evolution and Development" and introduces the subject as a rather diverse series of topics ranging from parallel pathways through the thalamus to effects of prenatal alcohol exposure on its development. If one is solely interested in what the book title suggests — thalamic networks — one might choose to skim these chapters briefly, although chapter 2 had some very interesting points on the evolution of interneurons in the thalamus. The second area of the book is entitled "Thalamus as a Relay" and is further divided into sensory, motor, and intralaminar areas of the thalamus and how they are organized as pathways to cortex. Six sensory chapters are devoted mostly to possible functions of the parallel pathways through the separate primary and secondary sensory nuclei and the possible functions of the intrinsic GABAergic circuitry. The four motor chapters cover detailed anatomical connections without much in the way of specific functional interpretations. The four chapters on the intralaminar nuclei, although having some thought-provoking points, are very difficult to assimilate because of the lack of a clear overview to tie together the overabundance of descriptive anatomy.

The third area of the book examined some of the "Chemical Identities of Thalamic Neurons" including CAMII and calbindin for labeling thalami pathways, NMDA metabotropic versus iontotopic paths, species differences in the GABAergic pathway, CCK effects, and NGF expression in the developing thalamus. Hendry's chapter on the third parallel channel (intercalated or koniocellular pathway) passing through the lateral geniculate nucleus was particularly interesting for me.

Finally, the last part of the book is entitled "Networks for Modulation" and covers the anatomy of the reticular nucleus of the thalamus, the types of oscillatory modes of thalamic neurons, and the possible control of sleep generation by the thalamus.

Despite a fair amount of speculation without much data expressed in several chapters and a few chapters covering subjects seemingly unrelated to the book's theme, there were numerous parts in this book that presented excellent data to make a clear case for a specific function by one or more thalamic nuclei. Particular emphasis was placed on the two modes that have recently been shown to be operating in the thalamic nuclei: a linear mode accurately representing the sensory or motor inputs to the neurons under alert, awake conditions and a bursting, nonlinear mode that occurs under drowsy, inattentive, or sleep conditions. The mode is determined by the underlying ionic channels and conductances in the plasma membrane that produce shifts in the membrane's DC potential. These shifts can lead to multiple oscillatory frequencies of the neurons, and the connections, both intrinsic and extrinsic, that may control the ionic channels and these modes are discussed in these chapters.

Overall, I thoroughly enjoyed reading most of this book and absorbing its contents. It will help neuroscientists, psychologists, neurologists, and others interested in how different states of an animal are achieved and the role that the thalamus plays in these states by updating many aspects of its connections and its physiology.

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Monitoring in Anesthesiology: Current Standards and Newer Techniques

David Royston and Thomas W. Freeley (Editors)
International Anesthesiology Clinics, Volume 31, No. 3
Boston, MA: Little, Brown and Co., 1993, 200 pp., illus., index, $39.00. ISBN: 0-316-27687-1

International Anesthesiology Clinics is a quarterly publication designed to summarize recent advances in selected key areas of anesthesia practice and research. This issue is dedicated to monitoring, and in 10 chapters it presents technological progress and supporting clinical data in the development of clinically useful monitors. Brevity is its strength and also its weakness, since the concise format allows consideration of only of a few modalities. The volume is well edited with a minimum of redundancy and with abundant references. The major areas include in-line blood analysis, monitoring myocardial ischemia, continuous cardiac output measurement, and measures of cerebral oxygenation. The thrust of recent innovations is toward continuous real-time display to replace intermittent time-delayed event measurement.

In-line blood analyses of gases and electrolytes are dealt with in two well-written chapters, one devoted to optical sensors and the other to ion-selective sensors. Both include historical overviews,

technical descriptions of the sensors, and potential applications. Although in-line blood gas sensors are now used occasionally in extracorporeal circuits, sufficient accuracy and reliability of indwelling sensors are yet to be achieved.

A chapter on monitoring of perioperative myocardial ischemia concerns primarily the detection sensitivity of magnetic resonance imaging, positron emission tomography, phosphorus nuclear magnetic spectroscopy, and single-photon emission computerized tomography. Few clinical data support the use of these complex devices as ischemia monitors. The author considers the question of a "true standard" for myocardial ischemia and includes a detailed review of current ischemia monitoring practice, a topic well discussed in other publications. A separate chapter on automated ST segment monitoring is more relevant, since computer-assisted ECG diagnosis is widely available. Two commercial systems are described in detail. Despite wide availability, the biological significance of the ischemia data generated has received little attention. Finally, a thorough review of the evolution of the pulmonary artery catheter, the technical and physiological variables affecting its information, and its clinical use and limitations is included.

Continuous cardiac output monitoring is treated in three chapters. A review of pulse wave form analysis for this purpose provides little that is new. Cardiac output by aortic blood flow estimated by an esophageal Doppler probe seems more promising, as does pulsed infusion thermodilution by pulmonary artery catheter. As extensions of currently used invasive techniques, both are likely to be pursued vigorously.

Continuous monitoring of cerebral hemoglobin oxygen saturation by measurement of jugular venous bulb saturation or by infrared spectroscopy is included with excellent descriptions of their theoretical foundations. Near-infrared spectroscopy is given particular attention as capable of providing information during low-flow states as in systemic hypotension, hypothermia, or nonpulsatile blood flow during cardiopulmonary bypass. Unfortunately, data supporting the validity of these measures during cardiopulmopnary bypass are inconsistent. A discussion of transcranial Doppler blood flow analysis was not included.

This quarterly issue presents an excellent overview of the horizon in clinical anesthesia monitoring. For the target audience of anesthesiologists, it achieved its goal. For those interested in an in-depth treatment of any of these modalities, it will be disappointing.

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New Insights In Vertebrate Kidney Function

J. A. Brown, R. J. Balment, and J. C. Rankin (Editors)
New York, NY: Cambridge University Press, 1993, 389 pp., illus., index, $110.00. ISBN: 0-521-38324-2

This new volume of the Seminar Series of the Society for Experimental Biology (SEB), UK, contains contributions from the symposium "In Search of Physiological Principles: The Use of Animal Diversity and Novel Technology" held in 1990 in Orlando, FL. It was cosponsored by the SEB, the American Society of Physiology, the American Society of Zoologists, the Canadian Society of Zoologists, and the Comparative Respiration Society. The stated goal of this symposium was to have internationally recognized comparative physiologists present an in depth and up to date analysis of various aspects of vertebrate renal physiology. A special emphasis was to be placed on the use of new techniques and on the identification of an agenda for future research. These goals have been largely met. Twenty-five investigators from Europe, Africa, Japan, and the USA authored 14 chapters in which renal function in nonmammalian species such as fish, amphibia, reptiles, and birds is discussed. The described data are compared with the corresponding information available in mammalian species. Overall, each chapter provides adequate details regarding established and new approaches to the study of virtually all aspects of renal physiology. This includes well referenced discussions of renal clearance and micropuncture techniques, the perfusion of isolated tubules, renal cell culture, and brush border membrane vesicle and patch clamp techniques. The information in the individual chapters is generally well presented, with diagrams and illustrations of high quality. Both published and some original data from the authors' own laboratories and from those of others are reviewed. Most chapters maintain a truly comparative orientation by discussing the nonmammalian renal data in the context of mammalian physiology.

The first chapter demonstrates that many of the questions regarding the control of glomerular filtration in nonmammalian species remain unanswered. The second chapter gives an overview of transport data obtained in isolated perfused proximal tubules from flounder, shark, and killifish. It is demonstrated that these tubules are capable of water, sodium chloride, magnesium, and sulfate secretion. The authors state that the physiological significance of this transport pattern is unknown. The third chapter, using tissue culture of winter flounder proximal tubules, demonstrates phosphate reabsorption and secretion. An interpretation of the described observations would have been helpful. The fourth chapter gives a detailed analysis of proximal tubular bicarbonate transport in the mammalian kidney. An excellent discussion of utilized techniques, the underlying physiology, the role of transporters and subcellular mechanisms, and their regulation is presented. The fifth chapter presents a good overview of the structure and function of the three segments of the amphibian (*Amphiuma*) distal nephron. For some of the electrophysiological studies, tubular giant cells were generated by fusing single cells in polyethylene glycol. Chapter 6 contains an interesting discussion of nitrogeneous waste excretion in amphibia. As carnivores, amphibia must eliminate nitrogeneous waste, and they accomplish this in a fashion appropriate for their habitat, i.e., aquatic amphibia (e.g., *Necturus*) are ammonotelic, the majority of amphibia are terrestrial or partially terrestrial (e.g., *Salamandra*) and thus ureotelic, and some African tree frogs are uricotelic. It is of note that terrestrial amphibia accumulate urea under dehydrating conditions, thus generating a favorable gradient for water uptake from the surroundings. Chapter 7 is an excellent review of the transport of glucose, amino acids, and organic anions and cations by reptilian nephrons. The physiological significance of amino acid secretion demonstrated by the author remains to be explored. Many similarities to mammalian proximal tubular transport are illustrated.

In chapter 8, the anatomy and function of avian kidneys are discussed. Unique to the bird kidney is its wide spectrum in nephron size and anatomy (small and loopless in the cortex, large and with loops of Henle in the medulla). The blood supply of the avian kidney is more complex than that of the mammalian kidney. Afferent arte-

rial supply comes from the aorta and ischiatic arteries, and afferent venous supply comes from portal veins that anastomose with peritubular capillaries of loopless cortical nephrons. Flow into this portal system is regulated via a valve situated in the external iliac vein. The function of the latter system is unknown. Bird glomerular filtration rate is 50% lower than that of comparably sized mammals. Postrenally, urine is further concentrated by active sodium reabsorption by the terminal rectum. Chapters 9 and 10 are complementary to the preceding chapter. They contain reviews on the concentrating and diluting mechanisms found in bird and mammalian kidneys. Chapter 10 is a particularly comprehensive treatise on the structure and function of the loop of Henle. Chapter 11 presents an intriguing hypothesis, according to which the inverse relationship between body size and urinary concentrating capacity is the result of "decreased tubular metabolism" in larger animals. Sufficient metabolic data are not presented. Chapters 12, 13, and 14 deal with the effects of peptide hormones on water and electrolyte transport along the mammalian nephron, the renin-angiotensin system in mammalian and nonmammalian species, and natriuretic factors in nonmammalian vertebrates. These chapters are well written and are a very useful resource for comparative physiologists. It is likely that space constraints made it necessary to delete newer information on the cellular effects of angiotensin II (mediating hypertrophy in vascular smooth muscle cells) and atrial natriuretic peptide (antimitogenic effects in vascular smooth muscle cells).

In conclusion, this book is a reasonably balanced and up to date compilation of renal anatomical and physiological data in vertebrate kidneys. Although the list of references is somewhat outdated (ends with 1990), much of the information should be useful to the student of renal physiology, biologists, and particularly those interested in comparative physiology. Some of the chapters would have benefited from a summary and from a brief overview of the physiological significance of the described observations.

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Clinical and Physiological Applications of Electrical Impedance Tomography

David Holder (Editor)
Bristol, PA: Taylor & Francis, 1993, 310 pp., illus., index, $95.00. ISBN: 1-85728-164-9 HB

This book is the collection of 32 papers presented at the first International Conference on Electrical Impedance Tomography (EIT) held in April 1992 at the Royal Society in London. The work is divided into five subgroups entitled "Introductory Reviews," "Recent Technical Developments," "Gastrointestinal EIT Studies," "Possible Applications of EIT," and "Cardiopulmonary EIT Studies." It provides an excellent overview of the strengths, weaknesses, and potential applications of EIT existing at the time of the conference.

Electrical impedance has been used for many years to detect and measure a wide variety of physiological events. Most of its applications have remained in the experimental realm. Clinically it has been used with varying degrees of acceptance for respiratory and apnea monitoring, detection of intrathoracic fluids, estimation of cerebral blood flow, phlebography, and measurement of cardiac output. Despite the desirable features of the method such as noninvasive, painless, harmless, inexpensive, and in many situations providing real-time information complete clinical acceptance, particularly for stroke volume and cardiac output, use of the method appears to await a thorough understanding of the physical causes of the impedance changes. EIT, by virtue of providing cross-sectional images of distributions of tissue resistivitives, shows excellent promise for defining the sources of impedance changes accompanying physiological events, thereby dispelling much of the uncertainty regarding clinical use of the impedance technique.

Electrical impedance imaging requires the use of a planar band of electrodes around the portion of the body to be imaged. To date most investigations have used an array of 16 electrodes. Current (5 mA at 50 KHz) is applied to one pair, and the resulting potentials between the remaining pairs of electrodes are rapidly sampled. The process is then repeated by applying the current to another pair of electrodes. A total of 104 independent measurements can be made in about 80 ms. Thus the greatest temporal resolution is 40 ms. The introductory portion of the book emphasizes the complexity of EIT, in comparison with other imaging techniques, resulting from the three-dimensional spread of the applied current and the inisotropism of the body. In addition to the problems imposed by current spread, spatial resolution is also limited by the number of electrodes that can be applied to the subject.

The section describing recent technical developments focuses on development of electrode systems, use of in vitro phantoms, miniaturization of the EIT system, mathematical techniques for image reconstruction, and statistical analysis of complex images. Most of the clinical work reported concerns gastrointestinal studies, particularly gastric emptying and motility as well as detection of gastroesophageal reflux. The clinical use of EIT for imaging of gastric emptying in both adult and pediatric patients is well documented.

Possible applications of EIT is directed toward measurements of nervous activity. For example, using electrodes directly on the brain, large impedance increases of 20–100% occur in several species during nervous activity. These large changes are easily detectable by intracranial electrodes, but, at present, imaging these changes from scalp electrodes is difficult but will perhaps become possible with further refinement of EIT equipment and image processing techniques.

Several interesting applications of EIT to the study of pulmonary function are described, such as detection of consolidated tumor in the lung, aspiration of pneumothorax, and changes in intrathoracic fluid volumes. Although these pathological states can be detected and monitored by other means, the simplicity of the impedance in providing portable, bedside continuous monitoring may fill a niche in patient monitoring not easily accomplished by the conventional techniques.

This book provides an outstanding bibliography and an excellent summary of the work to date in correlating changes in physiological activity with corresponding changes in electrical impedance. The editor has done an outstanding job so that, despite the number of papers and authors, there is very little redundancy in the contents. This work is very readable and is recommended to both physical scientists and clinicians who have an interest in further development of this technique.

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Isotonic Transport in Leaky Epithelia

Hans G. Ussing, Jorge Fischbarg, Ove Sten-Knudsen, Erik Hviid Larsen, and Niels J. Willumsen (Editors)
Proceedings of the Alfred Benzon Symposium 34, Copenhagen, 1992
Copenhagen, Denmark: 1993, 520 pp., illus., index, $66.15.
ISBN: 87-16-11074-9

This volume contains the 29 contributed papers along with the ensuing discussion from the 36 participants of the 34th Benzon Symposium held in June 1992. It is unfortunate that the symposium title, "Isotonic Transport in Leaky Epithelia," is more suggestive of a sparsely attended satellite conference than the wide-ranging content of these proceedings, which would have been better served by a more global title such as "Water Transport Through Channels, Cells, and Epithelia." The quality of this work derives from the stature of its authors and the effort made to provide succinct descriptions of extensive experimental investigation.

One classic problem in water transport is the identification of the route of water flux across the leaky epithelia. These epithelia (e.g., proximal tubule, small intestine, and gallbladder) are remarkable for the high-solute permeability of their tight junctions. They are also remarkable for their ability to transport large volumes from mucosa to serosa without generating a large osmotic gradient between bathing media. The precise relationship between these two observations provides a conundrum at least two decades old. Several papers from these proceedings address the issue of whether the tight junction can be a route of significant water flux, and the consensus seems to be affirmative. The observations include epithelial water permeability, which is greater than that estimated for the cells alone (Whittembury et al. and Kuang et al.), electrokinetic measurements in proximal tubule (Boulpaep et al.), unidirectional flux ratios influenced by net water flux across small intestine (Ussing and Nedergaard), and parallel modulation of tight junctional resistance and epithelial water permeability by protamine in gallbladder (Bentzel and Loeschke). Indeed, Pappenheimer and Madara have indicated that glucose absorption by intestine is severalfold greater than predicted from luminal cell membrane transport kinetics. In their scheme, increased cell sodium entry followed by cell volume and then cell calcium result in cytoskeletal contraction, opening of tight junctions, and substantial paracellular convective fluxes.

Mathematical models of the leaky epithelia have indicated that isotonic transport will be achieved if there is sufficient cell membrane water permeability. For these epithelia, interest in the cell membrane water permeability has received a tremendous boost with the identification of specialized water pores (Agre et al. and Verkman et al.) and with the recognition that proteins for coupled transport can also act as water pores with their own kinetics of opening (Fischbarg et al.). In the leaky epithelia, the density of these pores is not known to be regulated such that water flux is regulated by control of sodium and chloride transport. Thus the chapter by Boucher et al. reminds us that the airway epithelium is responsible for substantial isotonic reabsorption of alveolar secretions, and this brings considerations of the transport defect of cystic fibrosis within the scope of this volume. In contrast to the leaky epithelia, the tight urinary epithelia regulate water transport independently from solute reabsorption. The physiology of these antidiuretic hormone-driven events also receives considerable attention in these proceedings (Schafer, Harvey, Bourguet et al., and Taylor et al.) with a masterful summary of the cell biology of antidiuretic hormone-induced cycling of apical water channels (Ausiello et al.).

Given the progress toward the structural identification of water pathways, the theory of water flow assumes enhanced importance and is the subject of the final three chapters of this volume (Solomon, Finkelstein, and Brahm et al.). In view of the importance of junctional fluxes, one possible criticism of this symposium is the omission of the recent application of fiber matrix theory to model water transport across the tight junctions of the leaky epithelia. Special recognition should be given to the chapter by A. K. Solomon on urea and water transport through red blood cell membranes. This chapter synthesizes 40 years of data, demonstrating the quantitative importance of flux through the pores, relevance of the macroscopic equations to estimating pore permeability and reflection coefficients, and the likelihood that water and urea traverse the same pore. However, to make sense of the observed saturation kinetics of urea flux, a model of a tripartite pore is presented, with outer and inner solute binding vestibules associated with the pore. This chapter will stand as a classic in water transport and as an example of the mutual enhancement of experiment and theory.

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Principles of Exercise Biochemistry (Second Revised Edition)

J. R. Poortmans (Editor)
Medicine and Sport Sciences, Volume 38
Basel, Switzerland; Karger, 1993, 304 pp., illus., index, $125.00, ISBN 3-8055-5778-7

The stated purpose of this revised edition "is to update the original text" with suggestions from reviewers and information gained from new research findings over the last five years (the first edition was published in 1988). This edition contains, like the first, a collection of 10 reviews on topics of interest in the area of exercise biochemistry. Many of the authors are well known for their contributions to the research of exercise biochemistry. The chapters range in length from 18 to 44 pages and most have from 10 to 20 new references. The exceptions are chapters on "Basic aspects of metabolic regulation" and "Metabolic limitations in athletics," which are identical to those found in the first edition. *Principles of Exercise Biochemistry* is sparsely, but appropriately, illustrated. There are a number of illustrations summarizing metabolic pathways and their interconnections, and tables within the chapters often provide summaries of quantitative examples from recent research.

The book begins with a nicely developed chapter on the molecular mechanisms involved in muscular contraction (Rall and Wahr). Limitations as well as contributions from research methods involving myosin and actomyosin interactions in solution vs. structured systems are well delineated. This discussion leads to a description of differences in the contractile mechanisms and other cellular functions in the various "types" of skeletal muscle fibers (Thayer et al.). A succinct overview of the different fiber classification schemes as well as information on the distribution and characteristics of these fibers in various athletic populations are presented. These two chapters lead into the body of the text, which describes the metabolism

of three main fuel types used by the muscle, carbohydrates (Greenhaff et al.), lipids (Bulow), and proteins (Poortmans). The book also contains an excellent chapter pertaining to adenine nucleotide metabolism during exercise (Sahlin and Katz) and its relationship to the maintenance of optimal ATP/ADP ratios. In addition, each chapter describes how the metabolism is regulated to optimize performance and maintain optimal energy status in the muscle cells. Regulation and optimization of performance are also covered in separate chapters (Newsholme), but the theoretical treatment of metabolic flux at the start of the chapter on regulation of metabolism would have had more impact had it dealt with specific examples from the biochemical pathways described in preceding chapters. The limited number and the absence of new research citations in the chapters on regulation and metabolic limitations in athletics were disappointing. All of the chapters tie together well and give a succinct but complete description of the basic biochemistry and regulation of energy production by muscles. The text is completed by a well rounded discussion of recent advances in the areas of exercise and metabolic disorders (Young and Ruderman) and the molecular and metabolic mechanisms of muscular fatigue (Fitts and Metzger).

Research in the field of exercise biochemistry has increased tremendously, and it is important for texts to incorporate these new findings. The updating of material in *Principles of Exercise Biochemistry* is the primary improvement in this edition. Although this book should not be viewed as a comprehensive treatment of the biochemistry of exercise, it would certainly be appropriate as a graduate text and would be particularly useful because it is concise and readable. This book is a fine compendium of work related to metabolic regulation in exercise.

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Temperature Regulation in Laboratory Rodents

Christopher J. Gordon
New York, NY: Cambridge University Press, 1993, 276 pp., illus., index, $64.95. ISBN: 0-521-41426-1

Laboratory rodents (i.e., mouse, gerbil, hamster, rat, and guinea pig) are the animal models of choice in most of experimental physiology, medicine, and psychology. The regulation of their body temperature is affected by a host of surgical, pharmacological, and environmental factors. Alterations in body temperature affect most of the experimental systems of interest to researchers, be they psychological, physiological, or immunological. Unfortunately, many of the factors that impinge on thermoregulation of rodents are overlooked by researchers, and the data they collect may be greatly altered because the animals were febrile or hypothermic.

Gordon's book explains, in a very readable way, the elements of thermoregulation of lab rodents. He includes neural control, metabolism, effectors of temperature regulation, regional body temperatures, circadian rhythms, developmental patterns, aging, temperature acclimation, and variations due to gender and species. His research on effects of toxic substances as well as the discussions of trauma, hypoxia, and other stressful effectors of body temperature are included in a key chapter for this volume.

This volume is one of the rare reference books that becomes useful the day it arrives in your lab. This is true for thermal biologists but even more so for those who use rodents as animal models but have ignored their thermal biology and effects of altered thermal biology on the endpoints they study. A good example of this is appropriate environment for housing rodents to be used in lab experiments; i.e., what ambient temperature should be provided? Although the practice is common, most lab rodents are thermally stressed if they are kept at "room" temperature. Consequently, their metabolic rates will be significantly above basal levels and most pharmacological, nutritional, and toxicological data collected from such animals will be falsely interpreted. Gordon has collected a wealth of useful references and provides tables, e.g., on p. 65, that provide the guidelines for thermally neutral housing of common rodents.

The more than 700 references for this volume are well selected and a valuable resource by themselves. Thermoregulation is a highly integrated and holistic area of physiology. Consequently, it is an "orphan" branch of life sciences, and the relevant literature is scattered far and wide across time and among disciplines. The references reflect a scholarly search of the literature based on a career-long interest in thermal physiology.

Another key ingredient for a useful reference volume is the index. Here again this book excels in providing a comprehensive index of key terms to direct readers to ideas that are often spread throughout the book.

The book is well illustrated with carefully selected and informative graphs and charts. Tables are present where appropriate to review data that are not better presented as graphs, e.g., data on upper and lower critical temperatures of various species.

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Human Physiology (Sixth Edition)

Arthur J. Vander, James H. Sherman, and Dorothy S. Luciano
New York, NY: McGraw-Hill, 1994, 781 pp., illus., index, $63.59. ISBN: 0-07-066992-9

In the inaugural Claude Bernard Distinguished Lecture of the Teaching Section of the American Physiological Society, delivered at Experimental Biology '94 in Anaheim, CA, Arthur Vander presented "The Excitement and Challenge of Teaching Physiology: Shaping Ourselves and the Future." In his address, he quoted from a recent book (1): "Teaching is not just an addendum to research. It is not an obligation that comes along with the job. Teaching is the continuation of a culture, the continuity of what we have done and known, the sustenance of our intellectual life. . . . What kills a subject is the lack of good teaching, the inability to communicate whatever once gave it vitality."

Although I have never sat in a course taught by Vander, I *know* he is a good teacher through his undergraduate textbook. It has become a classic (now in its sixth edition) for undergraduate courses in physiology. Vander, James Sherman, and Dorothy Luciano, all of the University of Michigan, are accomplished *communicators* of the science of physiology. The book is a model of organization, content, and currency. The sixth edition has been extensively revised with over 100 topics rewritten and/or expanded upon. The study aids

include boldfaced key terms, summary tables, end-of-section or chapter study aids, key term definition lists, comprehensive review questions (essay format), challenging thought questions, an extensive glossary, and many other features.

The most unique study aid, introduced in the first edition (1970), is the flow diagram. Vander et al. pioneered it, and it has been much imitated in other physiology books ever since. The flow diagram distills complicated physiological systems, cycles, signal transduction pathways, and other involved processes into a meaningful "picture" that is a highly useful teaching/learning aid.

The diagrams in this book are outstanding, and all are in full color. For example, in the chapter on movement of molecules across cell membranes, a series of drawings showing models of ion channel structure, including the current understanding of channel subunits, is presented. Vander's discussion of mediated-transport systems (with accompanying diagrams) is the best I've seen.

This is a book students will read and study. The cover photograph showing a lone climber replete with pitons ascending a rock face invites the reader to find out how he performs such a feat; inset photographs hint at organ system contributions to his successful ascent by integrating his nervous, circulatory, respiratory, and muscular systems.

Several pedagogical and student supplements are available with this excellent book: (1) a study manual by Donna Van Wynsberghe of the University of Wisconsin-Milwaukee (a superior teacher of physiology in her own right); (2) a test bank with over 50 questions per chapter; (3) a set of over 100 overhead transparencies; and (4) computer software to accompany the text.

A person teaching an undergraduate course in physiology would be hard pressed to find a better primary text than this one. I enthusiastically recommend it!

David Bruce
Wheaton College, Wheaton, IL

1. Solomon, R., and J. Solomon. *Up the University: Recreating Higher Education in America.* Reading, MA: Addison-Wesley, 1993, p. 112–113.

Anthropometry: The Individual and the Population

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

This book is the 14th in a Cambridge series in biological anthropology. It comprises twelve presentations given at a one-day workshop in anthropometry, held in Cambridge, I believe in mid-1992.

G. W. Lasker opens with a brief historical overview. I was surprised his sketch did not mention such 19th century European giants of anthropometry as Quetelet and Hutchinson and found his style rather popular for a serious monograph: "worried silly," "debunking," "the body does not work that way," and "big" as the antithesis of "small" illustrate the problem.

Peter Dangerfield presents a scholarly account of growth asymmetries. The only statement that puzzled me here was the suggestion that the asymmetry of visceral organs was related to an "intrinsic handedness"—surely the left handed do not usually develop dextrocardia?

Stanley Ulijaszek and John Lourie make a useful analysis of the necessary precision of anthropometric data in terms of the technical error of measurement and coefficients of reliability, pointing out the need for enhanced precision when assessing the young child.

Nicholas Mascie-Taylor provides an overview of the statistical techniques used by the anthropometrist, with appropriate examples. This chapter will help to fill knowledge gaps for those who have learnt their statistics by osmosis rather than course work, although one puzzling word ("Wald," Table 4.9) remains unexplained.

T. J. Cole introduces the unusual (and undefined!) word of knemometry as he discusses various types of growth chart. He comments that growth around puberty can appear inappropriately slow or fast unless growth charts for this region are deliberately distorted.

Stanley Ulijaszek makes some rather brief observations on cyclicity in growth. This chapter could usefully have stressed that although this problem affects interpretation of individual growth, it can be overcome in population studies (for example, by making measurements on each child's birthday).

The next two chapters apply anthropometry to the problems of developing countries. Andrew Tomkins discusses the value of giving growth charts to mothers who may not understand graphs and lack the food to alter the status of their children. He finishes, more encouragingly, with instances in which anthropometry has encouraged innovative approaches to nutrition. C. J. K. Henry looks at minimum sizes associated with survival in the grim context of a triage of starving refugees, concluding that women can survive to a substantially lower body mass index than men can.

Peter Davis points to the difficulties of interpretation of skinfold data in children and (somewhat surprisingly) seems to favor the use of impedance technology.

N. G. Norgan reviews the influence of body size on the various physiological indices of performance. Ardent feminists may be provoked by his conclusion "there is no reason why the sexes should have the same $V_{O_{2max}}$ per unit mass or composition." Robert Malina further explores the influence of size on strength and motor performance in terms of the performance tests widely used by physical educators.

The final chapter, on anthropometry in the armed services (Claire Gordon and Karl Friedl), is particularly comprehensive, giving a fascinating glimpse of applications in selection; accession and retention standards; occupational assignment; and the design of equipment, work stations, and clothing, with comments on the impact of gender, racial heterogeneity, and secular trends upon the proposed standards.

As with most multiauthored publications, the individual papers vary considerably in length, style, depth, and content, but the volume as a whole provides a very interesting and readable overview of both the tasks faced by the anthropometrist and the ways in which these tasks are undertaken when large populations must be assessed.

Roy J. Shephard
University of Toronto

BOOKS RECEIVED

The Digestive System in Mammals: Food, Form and Function. David J. Chivers and Peter Langer (Editors). New York: Cambridge University Press, 1994, 446 pp., illus., index, $84.95. ISBN: 0-521-44016-5.

Lymphocyte Activation, Volume 59. L. E. Samuelson (Editor). *Chemical Immunology.* Luciano Adorini et al. (Series Editors). Basel, Switzerland: Karger, 1994, 219 pp., illus., index, $168.00. ISBN: 3-8055-5976-3.

Membrane Protein Structure: Experimental Approaches. Stephen H. White (Editor). New York, NY: Oxford University Press, 1994, 595 pp., illus., index, $65.00. ISBN: 0-19-507112-3.

Molecular Biology of Diabetes, Parts I & II. Boris Draznin and Derek LeRoith. Totowa, NJ: Humana Press Inc., 1994, 404 pp., illus., index, $99.50. ISBN: 0-12-283980-3.

Neural Activity and the Growth of the Brain. Dale Purves. Port Chester, NY: Cambridge University Press, 1994, 108 pp., illus., index, $15.95. ISBN: 0-521-455707.

NMR in Physiology and Biomedicine. Robert J. Gillies (Editor). San Diego, CA: Academic Press, 1994, 471 pp., illus., index, $95.00. ISBN: 0-12-283980-3.

Nomina Anatomica Veterinaria. (Fourth Edition), 198 pp., index. *Nomina Histologica* (Revised Second Edition), 66 pp., index. *Nomina Embryologica Veterinaria,* 64 pp., index. World Association of Veterinary Anatomists. Ithaca, NY: Cornell University, 1994, $12.00. ISBN: 0-9600444-7-7.

Nutrition and Aids. Ronald R. Watson (Editor). Boca Raton, FL: CRC Press, 1994, 257 pp., illus., index, $125.00. ISBN: 0-8493-7842-7.

Principles and Techniques of Practical Biochemistry. Fourth Edition. Keith Wilson and John Walker (Editors). New York, NY: Cambridge University Press, 1994, 586 pp., illus., index, $99.95. ISBN: 0-521-41769-4.

Pulmonary Care of the Surgical Patient. Leland H. Hanowell and Forrest L. Junod (Editors). Mount Kisco, NY: Futura Publishing Company, 1994, 400 pp., illus., index, $65.00. ISBN: 0-87993-568-5.

Scientific Meetings and Congresses

Considerations for Use of Wild Vertebrates in Research, NIH Office for Protection from Research Risks Workshop, January 12-13, 1995, Westward Look Resort, Tucson, AZ. *Information:* Terry May, Director of Research Administration, Northern Arizona University, PO Box 4130, Flagstaff, AZ 86011-4130. Tel: 602-523-6788; fax: 602-523-1075.

Potassium Channel Modulators, January 23-25, 1995, Washington, DC. *Information:* IBC USA Conferences, Inc., 225 Turnpike Road, Southborough, MA 01772. Tel: 508-481-6400; fax: 508-481-7911.

Renin-Angiotensin System, January 26-27, 1995, Washington, DC. *Information:* IBC USA Conferences, Inc., 225 Turnpike Road, Southborough, MA 01772. Tel: 508-481-6400; fax: 508-481-7911.

Scientific Conference on the Functional and Structural Aspects of the Vascular Wall, February 1-4, 1995, Snowbird Conference Center, Salt Lake City, UT. *Information:* American Heart Association, Scientific Conference on the Functional and Structural Aspects of the Vascular Wall, Scientific and Corporate Meetings, 7272 Greenville Avenue, Dallas, TX 75231-4596. Tel: 214-706-1772; fax: 214-373-3406.

Medical Imaging 1995, February 26-March 2, 1995, San Diego, CA. *Information:* Society of Photo-Optical Instrumentation Engineers, PO Box 10, Bellingham, WA 98227. Tel: 206-676-3290.

Humane Care and Treatment of Animals: Challenges and Changes for the Institutional Animal Care and Use Committee, NIH Office for Protection from Research Risks Workshop, March 12-14, 1995, San Diego Princess, San Diego, CA. *Information:* Danielle Demko, Public Responsibility in Medicine and Research, 132 Boylston Street, Boston, MA 02116. Tel: 617-423-4112; fax: 617-423-1185.

Sixteenth Annual International Gravitational Physiology Meeting, March 19-24, 1995, Reno, NV. *Information:* Environmental Physiology Laboratory, Karolinska Institute, 171 77 Stockholm, Sweden. Tel: 46-8334012; fax: 46-8339702.

Nitric Oxide: Advances in Therapeutic Application and Commercial Development, March 27-28, 1995, Philadelphia, PA. *Information:* IBC USA Conferences, 225 Turnpike Road, Southborough, MA 01772. Tel: 508-481-6400; fax: 508-481-7911.

Man in Space for Science and Technology Development, March 27-31, 1995, Toulouse, France. *Information:* IAA BP 1268-16, F-75766 Paris cedex 16, France. Fax: 33-1-47-23-82-16.

Life Sciences and Space Medicine, April 3-6, 1995, Houston, TX. *Information:* American Institute of Aeronautics and Astronautics, 370 L'Enfant Promenade SW, Washington, DC 20024.

ASPET Coloquium: Structure and Function of P_2-Puriniceptors, April 7-9, 1995. *Information:* ASPET, 9650 Rockville Pike, Bethesda, MD 20814. Tel: 301-530-7060.

Sixth International Symposium on Pharmaceutical and Biomedical Analysis, April 23-25, 1995, St. Louis, MO. *Information:* Shirley Schlessinger, 400 East Randolph Street, Suite 1015, Chicago, IL 60601. Tel: 312-527-2011.

Second International Conference, VIDEA 95, June 12-14, 1995, LaCoruna, Spain. *Information:* Audrey Lampard, Conference Secretariat-VIDEA 95, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO40-7AA, UK. Tel: 44-0-703-293223; fax: 44-0-703-292853.

Third International Conference on Computers in Biomedicine, BIOMED 95, June 21-23, 1995, Centro Congressi of the Palazzo delle Sterlline, Milan, Italy. *Information:* Jane Evans, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO40 7AA UK. Tel: 44-0-703-293223; fax: 44-0-703-292853; e-mail: CMI@uk.ac.rl.ib.

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

1995 Summer Bioengineering Conference, June 28-July 2, 1995, Beaver Creek, CO. *Information:* Kathy Vikers/Robert Hochmuth, Department of Mechanical Engineering and Materials Science, Box 90300, Duke University, Durham, NC 27708-0300. Tel: 919-660-5309; fax: 919-660-8963.

Recent Progress in Hormone Research, July 29-August 3, 1995, Skamania Lodge, Stevenson, WA. *Information:* The Endocrine Society, 9650 Rockville Pike, Bethesda, MD 20814. Fax: 301-5711869.

International Union of Biological Sciences, 4th International Congress of Comparative Physiology and Biochemistry, August 6-11, 1995, Birmingham, UK. *Information:* The Secretariat, Universal Conference Consultants, China Court Business Centre, Ladywell Walk, Birmingham B5 4RX, West Midlands, UK. Tel: 44-21-622-3644; fax: 44-21-622-2333.

IVth International Congress on Amino Acids, August 7-11, 1995, Vienna, Austria. *Information:* Professor G. Lubec, University of Vienna, Department of Pediatrics, A-1090 Vienna, Wahringer Gurtel 18, Austria. Fax: 43-1-40-400-3238.

Federation of European Physiological Societies (FEPS) First FEPS Conference, September 9-12, 1995, Maastricht, The Netherlands. *Information:* Conference Agency Limburg, PO Box 1402, 6201 BK Maastricht, The Netherlands.