THE PHYSIOLOGIST

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American Physiological Society's Strategic Plan

Last year Council decided to comprehensively review all Society affairs (past initiatives, current activities, and future opportunities). To this end, we held a Strategic Planning Retreat in January, followed by review and modification of the initial report from the retreat at the April Council meeting in Anaheim. The purpose of the retreat was to begin the process of strategic planning for the next several years. We have reached the stage where we need thoughtful input from membership about the plan. In this paper, we are presenting the goals and the specific objectives of each goal. We have not included details of specific implementation. The latter will depend upon final approval of the strategic plan. Our intention is to carry out these objectives between now and the year 2000. Further, the plan will be reviewed and modified annually.

I. Publications

Goal: To promote the publication of the highest quality journals, books, and pamphlets; to foster and facilitate the dissemination and understanding of physiological knowledge; and to promote the image of APS.

Objectives:

- To maintain and promote excellence in the publication program.
- To establish a long-term policy regarding self-sufficiency of individual journals.
- To explore the electronic publication of APS journals.
- To facilitate the publication of high quality educational materials for college and precollege students.
- To facilitate production of materials for the lay public promoting biomedical research and the use of animals.

We call attention particularly to the last three objectives, which open new directions. The electronic publication of our journals on CD-ROM (which will facilitate and enhance topic, key word, and reference searches) is being explored. Acceptance and use of electronic publication, however, does not eliminate the need for hard copy (printed) journals. It is not clear how librarians, physiologists, and other scientists will accept electronic publication.

The American Physiological Society is considering a task force to develop suitable physiological concepts for textbooks and curricula at all levels of pre-professional education (K-12, undergraduate university). Because of the importance

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

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

Each nominee must be nominated by a member of the APS. The nominator is responsible for completing the following application materials and forwarding three copies to the chairperson of the Award Selection Committee, postmarked no later than November 30, 1992.

1. A cover letter of support from the nominator.

2. Letters of support from three other colleagues familiar with the nominee's teaching career, one being the nominee's chairperson if possible.

3. Letters of support from up to 10 current and/or former students.

4. Scores on standard student evaluations of teaching effectiveness.

5. Competitive honors received, such as the Golden Apple.

6. Evidence of education-related activities outside the classroom, such as developing laboratory exercises or software, authoring textbooks or education research articles, education-related presentations at national meetings, educational committees within the institution, consultation with other organizations, public appearances, etc.

7. A copy of the nominee's curriculum vitae.

8. Any additional documentation that the nominee wishes to include, such as number of graduate students trained, number of undergraduate students pursuing careers in physiology, teaching innovations introduced, etc.

The person selected will receive the award at the banquet of the Teaching of Physiology Section at the annual meeting of the American Physiological Society in New Orleans on March 28, 1993. The Arthur C. Guyton Teacher of the Year will receive a framed, inscribed certificate, an honorarium of $1,000, and expenses of up to $900 to attend the meeting.

The Chairperson of the Award Selection Committee is Roger Thies, Department of Physiology, University of Oklahoma Health Sciences Center, Oklahoma City, OK 73190. Tel: 405-271-2226; Fax: 405-271-3181.

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Deadline for submission of material for publication: Dec. 5, February issue; Feb. 5, April issue; April 5, June issue; June 5, August issue; Aug. 5, October issue; Oct. 5, December issue. **If you change your address or telephone number, please notify the central office as soon as possible.**

Headquarters phone: 301-530-7164. Fax: 301-571-1814.

A Matter of Opinion

Time is of the Essence

The recent political upheaval in the former Soviet Union (FSU) and the countries of Eastern Europe has provided the Western democracies with historic challenges and opportunities. If those countries are to make the smooth transition to market-driven democratic societies, it will be necessary for the governments of the Western democracies to provide them intellectual as well as economic assistance.

Recently there have been many accounts of the plight of science and scientists in the FSU. Many scientists are abandoning research for other employment that will provide them with—at least—a subsistence livelihood. In short, the entire infrastructure of a scientific enterprise rich in tradition and potential is on the verge of collapse.

In an effort to identify how to preserve the basic science capability of the former Soviet Union, D. Allan Bromley enlisted the assistance of the National Academy of Sciences, which organized a workshop that brought together 120 leaders of the US science and engineering community to consider this immense and pressing problem. The recommendations presented in the report[1] must be viewed as suggestions, for each has its potential drawbacks and difficulties. The unmistakable messages, however, are that a scientific "Marshall Plan" is needed and that time is of the essence if we are to help preserve the scientific infrastructure of the new republics of the FSU.

The workshop report identified areas appropriate for governmental and industrial intervention as well as for individuals and professional societies. The recommendations for Non-Governmental Organizations (NGOs) include the following.

The near term

1. Scientific societies (national and international) should be encouraged to ask members to assist FSU scientists by sending journals, expanding electronic mail networks (especially outside Moscow), and providing funds for travel to meetings.

2. NGOs can help to identify individual scientists and research groups that are leaders in their fields with whom collaborative research could be established.

3. Private foundations and professional societies can help to publicize opportunities for collaboration of FSU scientists with American scientists.

4. Private organizations should establish mechanisms for the transfer of hard currency to the FSU, when accountable banking systems have been established.

The long term

1. NGOs and scientific societies are encouraged to identify and support similar organizations in the FSU and to promote their growth.

The problems of the FSU republics and the Eastern European countries were a topic that generated considerable discussion during the APS Council meeting in Anaheim. The problem, while not much different from that faced by scientists in many developing countries, is unique because of the long traditions and existing strengths of these countries' scientific establishments. For that reason, the Council was determined to identify ways in which it could be of assistance to our colleagues and sister societies.

Several societies, including the American Astronomical Society and the Society for Neuroscience, have solicited donations from their members to provide cash grants to scientists in the FSU. Unfortunately, this effort suffers from the absence of an administrative structure to reliably distribute funds to worthy and needy scientists. Several governmental organizations and foundations are working to overcome this hurdle. Should it be surmounted, the Council will consider making a direct financial commitment and will be inviting the membership to participate in our efforts.

For the present, the Council will extend its program for the distribution of journals to developing countries to the countries of Eastern Europe and FSU. The Society will provide an additional 50 journal subscriptions to libraries in the FSU and Eastern European countries. Your assistance in identifying appropriate institutions for receipt of these journals would be greatly appreciated.

In 1988 the APS signed a bilateral agreement with the Pavlov All-Union Physiological Society to facilitate short-term visits of American and Soviet physiologists. While the All-Union Society no longer exists, efforts are underway to contact sister societies in each of the republics to duplicate this program. Contact has been made with Oleg Gazenko, Chair of the Russian Physiological Society, who is working to identify FSU institutions to receive the APS journals.

The membership is also encouraged to "adopt a physiologist." Many of us know scientists in these evolving democracies who would benefit from the receipt of publications, equipment, and supplies to maintain their scientific capability. Take the time to contact them and help in our efforts to maintain the scientific integrity of these countries, a key element in their efforts to convert to stable market-driven democratic societies. Please let us know if the APS can be of assistance to you in these matters.

While the challenges are immense, even small contributions count and time is of the essence.

Stanley G. Schultz
Martin Frank

[1] *Reorientation of the Research Capability of the Former Soviet Union.* Report of a Workshop on March 3, 1992. Washington, DC: National Academy Press, 1992.

STRATEGIC PLAN
(continued from p. 37)

of a knowledgeable public, who will continue to enthusiastically support biomedical research and the use of animals in research, we plan to investigate newsletters or other materials suitable for the lay public to be made available through schools and libraries.

II. Meetings

Goal: To make the scientific meetings of the APS so exciting that the best minds in science will be attracted to the field of physiology.

Objectives:

- To conduct meetings that cover the spectrum of physiology from molecules through organisms.
- To ensure the timeliness of scientific programs by allowing the inclusion of the latest scientific developments.
- To promote meetings that foster intersocietal interaction.
- To develop a means for marketing the scientific meetings more effectively.
- To foster regional scientific meetings.
- To foster meetings that promote the educational and public policy objectives of the APS.

We call attention to the last three objectives, which are new. These include improving publicity about the APS meetings and improving the attendance and participation by young scientists. The Society is anxious to assist regional physiology groups to develop chapters and to promote regional scientific meetings.

The Society is moving in the direction of promoting other types of meetings that serve specifically the educational and public policy objectives of the APS (see goals III and IV below).

III. Education

Goal: To foster excellence in physiology education appropriate for each constituency of the APS.

N. C. Staub (left) and H. Valtin reflecting on strategies for meetings and education programs.

Objectives:

- To develop a continuing education program designed to enhance the research and teaching capabilities of physiologists.
- To foster programs designed to attract the best students to physiology.
- To ensure that physiology is appropriately represented in health science education.
- To help develop a scientifically literate public and to promote their awareness of physiology.
- To promote the appreciation of physiology in other sciences.

Although the APS has had a continuing interest in education and has promoted various educational activities since 1950, education has never before been a major goal of the Society. There is a national ferment to improve science education and science literacy. The APS is ready and willing to take a leading role in these activities. The intention is to involve the Society in education at all levels from kindergarten to medical and graduate schools as well as in education for the public. To this end, the Council has directed the Society to employ an education officer, who will coordinate and carry out the various education policies developed by Council.

IV. Public Policy

Goal: To develop and maintain a proactive program designed to influence governmental, professional, and

institutional organizations, as well as the public-at-large in their formulation of policies and activities related to the interests of APS.

Objectives:

- To achieve an enhanced voice in policy-making organizations at all levels.
- To increase public awareness and promote legislative actions to facilitate the continued use of animals in research and teaching.
- To enhance the public's appreciation and support of physiology.
- To develop a code of ethics.
- To foster interactions with other organizations.

The Society has improved its public affairs activity. We have a part-time public affairs officer. The Council believes the Society should continue to enhance its activities in the policy-making arena so as to improve the appreciation of physiology and of how physiologists do research.

The Society has a statement of ethics in the Bylaws, but we need to reformulate our position in terms of due process to protect individual and societal rights.

V. Membership

Goal: To increase membership in the APS by attracting and retaining increased numbers of individuals who are part of the APS constituency and by improving membership benefits and services.

Objectives:

- To have at least 9,000 members by the year 2000.
- To increase the number of members under the age of 40, the number of female members, and the number of individuals from under-represented minorities in the Society.
- To have all physiology chairs and faculty as members of the APS.
- To have all editors, associate editors, and editorial board members as members of the APS.
- To remove the residency requirements for regular and associate members.
- To establish a membership category to include individuals who do not meet the Society's research requirements.
- To provide the membership with greater benefits.

Continued increases in membership will keep the Society viable and forward looking. All of the membership objectives are aimed at filling that need. In addition, however, it is desired to enhance the discipline of physiology in professional schools and among other interested people.

The possibility of establishing a membership category in parallel to the regular membership, which will include individuals who wish to participate in Society activities but do not meet our regular research requirements should be explored. A number of scientific organizations have such parallel groups, which function efficiently and usefully and interact with the Society.

(l-r, 2nd row): C. V. Gisolfi, J. Whitehead, C. M. Tipton, H. Valtin, F. G. Knox, F. W. Powell, Jr., L. S. Jefferson, N. A. Alpert, J. S. Cook, W. S. Spielman, D. J. Ramsay, F. J. Haddy, and M. Frank. (l-r, lst row): H. J. Cooke, J. E. Hall, A. W. Cowley, Jr., N. C. Staub, S. Chien, S. G. Schulttz, B. R. Duling, and L. G. Navar.

VI. Finance

Goal: To maintain the fiscal health of the APS.

Objectives:

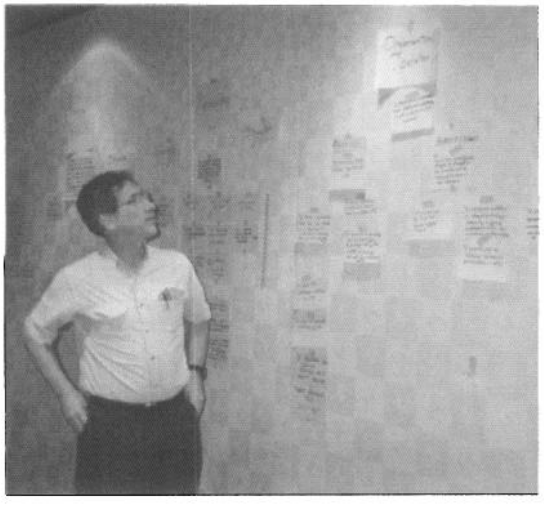
- To develop a long-term plan for utilization of a portion of investment earnings for Society development.
- To develop policy concerning the achievement of self-sufficiency/profitability of APS Conferences and Meetings.
- To develop policy concerning the achievement of self-sufficiency/profitability of each journal and the publications program.
- To develop policy concerning the achievement of self-sufficiency of general Society operations.

VII. Awards and Grants

Goal: To utilize the awards and grants program to strengthen the discipline and to recognize and recruit new members.

Objectives:

- To recognize excellence in physiology, especially by young investigators.
- To expand awards and grants in order to increase scientific participation in the APS.



B. R. Duling proposes strategies for the Society's organization and operation.

- To raise funds from outside sources for awards and grants.

This is aimed at attracting and maintaining young vigorous scientists, who will lead physiology in the 21st century.

VII. Society Organization

Goal: To match headquarters staff to the needs of an annually reviewed strategic plan.

Objectives:

- To establish a marketing program by 1993.
- To establish an education program by 1993.
- To encourage the formation of regional chapters.
- To increase participation of women, under-represented minorities and junior members on committees.

We hope to establish a marketing and an education program that will enhance the ability of the APS to move forward effectively.

VIII. Governance

Goal: To develop representational governance.

Objective:

- To ensure that the governance structure allows for appropriate representation by all APS member constituencies.

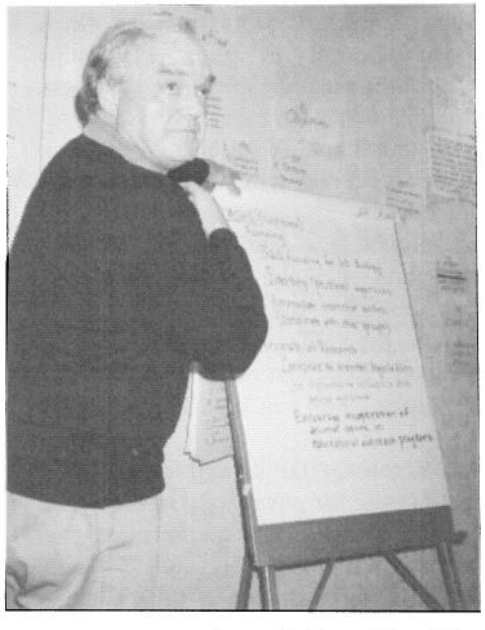
Norman C. Staub
Past President

Stanley G. Schultz
President

Martin Frank
Executive Director

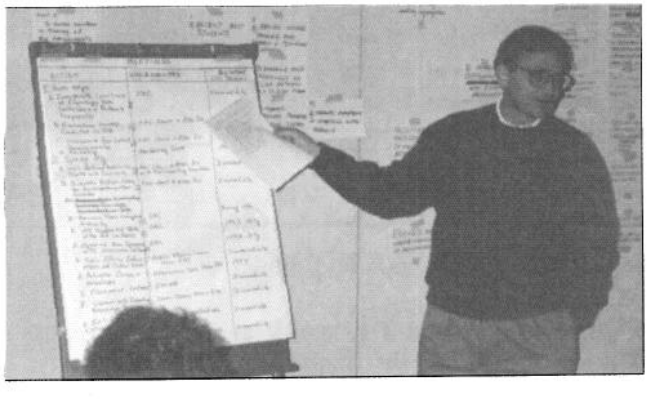
S. Chien (left) and S. G. Schultz relaxing.

W. S. Spielman recording deliberations of membership group.

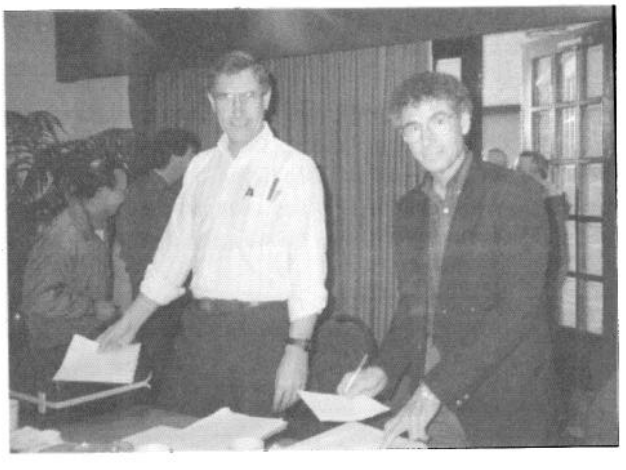


D. J. Ramsay presenting tasks for public affairs activities.

(l-r, standing): W. S. Spielman, C. M. Tipton, and N. C. Staub. (l-r, seated): S. Chien, S. G. Schultz, H. J. Cooke, J. E. Hall, and F. G. Knox reviewing various presentations.



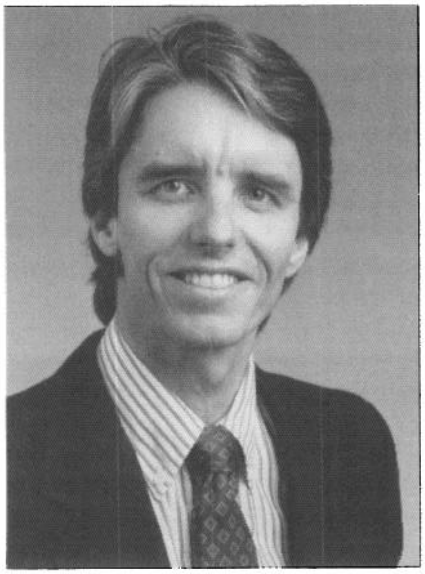
A. W. Cowley, Jr. introducing issues related to meetings and conferences.



B. R. Duling (left) and L. S. Jefferson comparing notes on Society governance.

Introducing . . .

Frank W. Powell, Jr.



Frank W. Powell has returned to the Education Committee, this time as chairman (1992–1994), having previously served on the Committee from 1987 to 1990. He is an Associate Professor of Medicine in the Physiology Division at the University of California, San Diego and is on the editorial boards of *Journal of Applied Physiology* and *Respiration Physiology*.

After receiving a BS degree in biological sciences at the University of California, Irvine, in 1974, Powell entered the Physiology Graduate Group at UC Davis as an MS candidate. His goal at that time was to produce educational audiovisual materials in the life sciences. He decided to study physiology because of its central position in the hierarchy of biological systems, reasoning that it would be easiest to understand and collaborate with both molecular biologists and ecologists if he had training at the organismic level.

In pursuing the MS degree Powell became excited about basic research and applied for a Deutsche Akademische Austauschdienst Scholarship to study at the Max Planck Institute for Experimental Medicine in Gottingen, Germany. He received the scholarship and completed a dissertation project in Gottingen for which he was awarded a PhD in physiology from UC Davis in 1978. His research has remained focused on comparative and respiratory physiology since entering graduate school and becoming intrigued by the question, "How do birds get enough oxygen to fly at altitudes rendering humans unconscious?" Studies at altitude acclimatization and adaptation to chronic hypoxia have taken him to the University of California White Mountain Research Station, where he was an assistant research scientist from 1985 to 1989 and to the hypobaric chambers in the Biotron facility at the University of Wisconsin–Madison for a sabbatical in 1987. Not only can questions such as the one about birds at altitude motivate a research career, but he believes such questions can be used to arouse the natural curiosity of precollege students and make them aware of our discipline.

Powell's main goal with the Education Committee is to define its role in achieving the numerous educational objectives identified by the new Strategic Plan. We need to determine which objectives the committee can initiate and achieve principally through its own efforts and which can be attained more efficiently by other APS groups (e.g., the Teaching Section). Ongoing committee business includes the Summer High School Teachers Program, developing Refresher Courses and Techniques Workshops for meetings, and collaborating with the Publications Committee in a review of the educational mission of APS journals. New directions include obtaining external support for APS coordination of effective educational partnerships between physiologists and precollege teachers. Powell strongly supports the Strategic Planning Objective to develop an Education Office staffed by an Education Officer at the APS headquarters to lend continuity to these diverse aims.

Powell also will encourage the committee to define and emphasize a central role for physiology in educating modern biologists. This follows from the reasoning he used in deciding to study physiology; i.e., understanding the entire hierarchy of living systems and their interactions is most profitably approached from somewhere near the middle of the hierarchy. "This idea occupied me recently when I chaired the UCSD Physiology/Pharmacology PhD Program and implemented its reorganization into a Biomedical Sciences PhD Program," Powell noted. "This involved expanding our curriculum in cellular and molecular biology and developing a new systemic physiology course to train students with research interests focused on cellular and molecular biology."

High School Science Teachers Fellowships

Applications are being accepted for the High School Teachers Physiology Research Program. Deadline for receipt of applications is January 15, 1993. Grants are $5,000, plus $750 allowance to attend the annual Experimental Biology Meeting. *Information:* High School Teachers Research Program, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991.

Introducing . . .

Heinz Valtin

Photo by Jonathan E. Sa'Adah

On January 1, 1992, Heinz Valtin succeeded Carl Gisolfi as chair of the APS Program Committee and the Program Advisory Committee. Valtin has assumed this post during a time of major changes in the scientific programming of APS, which were begun during the tenure of Gisolfi. These changes, which were reassessed and reaffirmed at the Strategic Planning Retreat of the APS Council last January, are 1) a revamping of the spring meeting of the Society (formerly FASEB), now renamed Experimental Biology '93, '94, etc., and 2) the initiation of APS Conferences..

The spring meetings will emphasize major themes in experimental biology that will be carried from year to year and that will be organized largely as invited intersociety symposia and as minisymposia constructed from volunteered abstracts. Approximately two APS Conferences are to be held each year, between June and December so as not to interfere with the spring meetings. These conferences will deal with the most current topics of physiological investigation, and they will be selected competitively from submitted proposals. All expenses for the conferences are guaranteed by the APS. Valtin states that the aims of the scientific programming of APS should be "to have each session, so far as possible, reach from the molecule to the organism, and to make the scientific programming of APS so exciting that the best minds in science will be attracted to the discipline of physiology."

Valtin is a graduate of Swarthmore College, and he received the MD degree from Cornell. For 12 years he chaired the Department of Physiology at Dartmouth Medical School, where he held the Andrew C. Vail Professorship and where he is currently the Constantine and Joyce Hampers Professor. He is known worldwide for his highly successful textbooks, especially *Renal Function*, which is about to go into its third edition. He has received many teaching awards and for many years has directed an NIH Training Grant in renal function and disease.

Valtin's research, supported by the NIH for nearly three decades, has been focused on the urinary concentrating mechanism, including the cellular action of vasopressin. He is known particularly as the developer of the Brattleboro Rat, an extremely useful animal model of hypothalamic diabetes insipidus that is used expensively to this day by investigators on four continents. An international conference on this animal was held at Dartmouth in 1981, and the proceedings of this meeting, published as an *Annals of the New York Academy of Sciences*, remains a much-consulted reference.

Valtin has held many advisory positions, including NIH study sections, editorial boards, and the National Board of Medical Examiners. Through the International Union of Physiological Sciences (IUPS), he has been very active in international physiology. He was involved in founding *News In Physiological Sciences*, and he has served on the Joint Managing Board of this journal since its inception. In his capacity as Chair of the Renal Commission of the IUPS, Valtin organized the first conference in Africa ever to be devoted entirely to the kidney. That meeting, held in Nairobi in 1986, was followed nine months later by a pan-African conference on "The Kidney and Electrolytes"; the founding of the African Association of Nephrology arouse out of these two conferences.

For six years ending in 1990, Valtin served as Treasurer and member of the Executive Committee of the IUPS, and in this capacity he became very instrumental in promoting the causes of physiology in the Third World and in eastern Europe. He has lectured in Latin America and in many countries of eastern Europe. His services in the latter region have been recognized by the Purkinje Medal from Czechoslovakia and the Pavlov Medal from the former Soviet Union.

Valtin invites the membership of the APS to contribute ideas to what he hopes will be increasingly exciting and current scientific meetings.

Fall Meeting of the Council of Academic Societies

The fall meeting of the Council of Academic Societies (CAS) was held in association with the annual meeting of the Association of American Medical Colleges in November. CAS has always had medical education and research as its primary concerns, and increasingly in recent years it has taken on responsibility, along with AAMC, for the following research issues: biomedical research policy, government support of the National Institutes of Health (NIH), indirect cost reform, scientific integrity, and research conflicts of interest, because they are of major concern to medical faculties. The following CAS and AAMC sessions focused on research issues that may be of interest to members of the American Physiological Society.

Supporting the Health Science Research Effort: Strategies for the Community

In this session, presentations focused on advocacy efforts to increase awareness by Congress and the public of the continuing need to support biomedical research. John R. Durant, Vice President for Health Affairs, University of Alabama, addressed the need for the scientific community to present a more unified front, particularly when lobbying Congress with regard to the NIH budget. In recent years, advocacy groups have focused on "mechanisms," i.e., numbers of grants and dollar amounts, which have tended to encourage Congress to take a "micromanaging" approach by setting limits on the various types of grants (individual investigator awards, program projects, training grants, contracts, etc.), and "caps" on dollar amounts, rather than a more rational approach focusing on diseases and scientific needs of the country. There is a need for many scientist advocacy groups to cooperate in making their common priorities paramount in the budgetary process.

Herbert Pardes, Dean of Columbia University College of Physicians and Surgeons, cited the need for more cooperation among the various groups that have a vital interest in maintaining support of biomedical research: community groups, scientists, NIH, government policy makers, and volunteer health organizations. Thomas D. Pollard, Director of Cell Biology and Anatomy at Johns Hopkins University, also cited the need for a better approach to the budgetary process, which is the main support of the nation's research effort. He noted the efforts of individual scientific societies in helping to establish a congressional biomedical research caucus and to identify potentially supportive legislators who may have an interest in, and knowledge of, biomedical science.

Research/Scientific Publishing

This session was organized around issues relating to publication, such as legal authorship, responsible authorship, and the relation of publication to promotion. Robert M. Andersen, former General Counsel to the National Science Foundation (NSF), discussed "Legal Aspects of Authorship." He stated that NIH and NSF have written regulations on misconduct with which institutions receiving their funds must comply. Their regulations cover fabrication or falsification of data and plagiarism in reporting results of research. In addition, "pure gift authorship," i.e., inclusion of people in the list of authors who did not actually contribute to the work, is a serious deviation from the regulations, even though it is quite common in some institutions, particularly with regard to inclusion of students as authors.

Marcia Angell, Executive Editor of the *New England Journal of Medicine*, discussed "Responsible Authorship, Reviewing, and Publication" and focused on the responsibilities of authors, peer reviewers, and editors. Authors have the responsibility to be honest in reporting what they did and what they found (i.e., accurate methods and results). They must also be responsible in giving and taking credit for authorship. Authorship is not a social nicety; it must be meaningful. All authors listed on a work should be able to defend the whole manuscript publicly—thus only those who have made a substantial contribution to conception, design, performance, analysis, interpretation, and writing should be included. Those contributors who have merely supplied patients or tissues should be acknowledged, but they should not be included in the list of authors.

Peer reviewers of manuscripts should be willing to review promptly; although they are not usually paid and it is time consuming, it is a collegial responsibility that is considered a part of good citizenship. They should be thorough, fair, temperate, and dispassionate. They should hold in confidence all information gained; thus manuscripts should not be copied or discussed with colleagues. Scientists should not review work that is exactly the same as their own study, because their critiques may be perceived as biased or tainted by self-interest.

Finally, editors have responsibilities toward readers and authors, as well as journal owners. In a heterogeneous journal like the *New England Journal of Medicine*, readers want short, clear, timely, and accurate articles; authors are interested in promptness of peer review, honesty, fairness, and the

ability to appeal a decision; owners are interested in profit, prestige, and pleasing advertisers, and if it is a society journal, in serving as an outlet for members. When these become competing interests, the editor must adjudicate them, but clearly the readers' concerns should be paramount. Editors also play a role in determining whether there has been misconduct (fraud). They can't always discern it beforehand, but they should follow up on serious allegations. They should also be alert to warning signs, e.g., spectacular results, implausible results, data that are "too neat" (no variance). If it is later found at the institutional level that misconduct has occurred, editors have an obligation to retract fraudulent studies.

Eleanor Shore, Dean for Faculty Affairs at Harvard University, in her session on "Publications and Promotion and Tenure Standards," discussed ways to improve the evaluation of bibliographies for promotion. A bibliography might be categorized into original reports, reviews, book chapters, editorials, and nonpublished works such as videotapes. Each institution should have written rules for each rank and step as to the expected quantity and quality for the various categories. However, some institutions have gone to a system of evaluation that sets a maximal number of publications that can be submitted for evaluation at each rank to emphasize quality over quantity. At Harvard it is 5 for assistant professors, 7 for associate professors, and 10 for professors. The candidate decides which ones are the most substantial and therefore representative of the overall quality of his/her work.

Indirect Costs of Research: New Challenges for Administrators and Faculties

In this session Albert A. Barber, Special Consultant to the Chancellor of University of California, Los Angeles, discussed the university perspective on indirect costs. Faculty and administrators have differing views on rates and inclusions; therefore there is no all encompassing "university view." Indirect costs are negotiated for each institution and cover general administration, departmental administration, sponsored projects administration, utilities, building operation and maintenance, library facilities, and student services.

Mordecai Blaustein, Chairman of Physiology, University of Maryland School of Medicine, discussed the faculty perspective. He noted that faculty feel there is a dilemma: the larger the share of research dollars that is used to cover indirect costs, the smaller the share available for direct costs. Investigators have no discretion in indirect costs, yet they are affected by them and they feel they don't receive the benefits from them that they should, particularly when they must pay heavy recharge fees for university services out of direct costs. I would behoove university administrators to have a dialogue with investigators about indirect costs and how they relate to the fiscal needs and resources of the university, so that both will feel they have a common cause and are sharing responsibility.

Donald A. Henderson, Associate Director of Office of Science and Technology Policy, and Mike Stephens, Majority Staff Assistant, House Subcommittee on Appropriations, Labor, HHS, Education, gave the government/congressional perspectives. The recommendation has been made that direct costs should be increased and indirect costs decreased because of widespread opinion that in many instances indirect costs have been excessive and subject to abuse. A Task Force has been created to determine the best ways to change the balance, and a 26% cap on administrative costs has been suggested.

Sarah D. Gray
University of California, Davis
George A. Hedge
West Virginia University
APS Representatives
Council of Academic Societies

Call for Nominations

Editor
Journal of Applied Physiology

Nominations are invited for the editorship of the *Journal of Applied Physiology* to succeed Neil S. Cherniack, who will complete his second term as Editor on June 30, 1993. The Publications Committee plans to interview candidates in August and September 1992. Applications should be received on or before August 1, 1992. Send nominations, accompanied by a curriculum vitae, to the Chair of the Publications Committee, Charles M. Tipton, Department of Exercise and Sports Sciences, University of Arizona, Tuscon, AZ 85721.

APS Conference
The Cellular and Molecular Biology of Membrane Transport

November 4–7, 1992
Orlando, Florida

The 1992 APS Conference: The Cellular and Molecular Biology of Membrane Transport offers a special opportunity to APS members who are interested in the structure, function, and regulation of membrane transport proteins. This meeting is a joint effort of the Epithelial Transport Group and Cell and General Physiology Section of the American Physiological Society. The meeting will emphasize the use of contemporary cellular and molecular biological approaches to study two major aspects of membrane transport physiology. First will be an examination of the structure and function of membrane proteins. Second will be an examination of the cellular regulatory processes that control the activity and expression of transport proteins in the membranes of different cells. This part of the meeting will include both signal transduction mechanisms as well as the regulation of the genes encoding transport proteins.

The concentration of invited speakers and attendees will provide an atmosphere that will foster significant discussion and promote new ideas in the actively growing area of basic cellular research. You are encouraged to add to the scientific atmosphere by presenting your current research as a poster presentation. In addition, there will be fellowships for student travel available on a competitive basis. We look forward to interacting with you at the conference.

Deadline for receipt of abstracts is July 10, 1992.

Douglas Eaton
Lazaro Mandel
Organizers

Wednesday, November 4	Thursday, November 5	Friday, November 6	Saturday, November 7
Registration and Reception	Morning Symposium 9:00 a.m.–Noon Structure and function of membrane ion channels Douglas Eaton	Morning Symposium 9:00 a.m.–Noon Structure and function of membrane carriers Doug Fambrough	Morning Symposium 9:00 a.m.–Noon Cellular modulation of membrane transport Lazaro Mandel
Evening Lecture 8:00–9:00 p.m. Molecular properties of voltage-gated *ion channels* William Catterall	Afternoon Posters 1:00–4:00 p.m.	Afternoon Posters 1:00–4:00 p.m.	Afternoon Symposium 1:00–4:00 p.m. Posttranslational regulation of ion channels Jack Kaplan
	Evening Symposium 7:30–10:00 p.m. Molecular approaches to the properties of calcium channels William Agnew	Banquet 6:00 p.m.—Reception 7:00 p.m.—Dinner	
		Evening Lecture 8:00–9:00 p.m. Molecular biology of lac permease Ron Kaback	

Graduate Students Initiate Liaison With Area High School Students

Recently, a group of graduate students in the department of physiology at the University of Western Ontario began a program to encourage interaction between secondary school students interested in the biosciences and university students who have made a commitment to the field. Our specific objectives are 1) to develop communication links between scientific educators at various levels and encourage continuing interaction, 2) to provide information about scientific research in the university setting, 3) to provide information about science programs offered at U.W.O., and 4) to raise awareness of issues related to the use of animals in teaching and research.

An introductory letter stating our objectivies was sent by the outreach coordinator (graduate student) to the heads of science at local secondary schools. Each graduate student was then matched with one school and asked to send a personal note of introduction. The response has been very promising. Although we had envisioned our role as a "switchboard operator" initially, personal interaction was desired by the secondary schools. To date, we have hosted visits of several senior science classes. Students have seen third-year neurophysiology laboratory classes, visited several research laboratories, spoken with many faculty members, and toured the University Animal Care facilities. Visits usually last half a day and are begun by a general introduction to research within our department. On other occasions, graduate students have visited their assigned secondary schools to speak with the students. Topics of interest have included careers in physiology, departmental research interests, the understanding of physiological concepts using simple experiments, and the use of animals in our work. Before the program began, graduate students were taught how to deal with sensitive ethical questions that students often raise. We have discovered that the younger students have a keen interest in our department. In addition, secondary school teachers seem less reluctant to deal with graduate students who often act as a liaison between the high schools and other qualified individuals on campus.

In addition to exposing a younger (university-bound) audience to scientific research, we have attempted to counter some misunderstandings regarding the use of animals in research. Many younger students have developed strong views against the use of animals. Unfortunately much of their education in this area has come from propaganda disseminated by extreme anti-vivisectionist organizations. These students must be informed of the many reasons why the use of animals in scientific research is indispensible. We have found that most are eager to talk about this topic and always leave our sessions with an enhanced understanding for our position.

Although our outreach program is in its early stages, the rewards are readily visible. Following a tour of our facilities, a senior biology class sent written comments, which included the following.

"After being there, science is a stronger possibility for university."

"I felt that the tour was very beneficial. It was interesting and dispelled a lot of misconceptions I had about using animals for research."

"The tour opened up a whole new universe of research to me."

"We learned a lot. . . . It made me wonder why they make the animals on TV look like they're abused."

"It was nice to see the facilities and to have the opportunity to ask questions of the people who use them. You gave us a realistic and honest look at [animal] research."

Dealing with the secondary school has been quite challenging but a great deal of fun. We encourage all other universities to strive to raise awareness regarding scientific research.

Bonnie M. Schmidt
University of Western Ontario
London, Ontario, Canada

News From Senior Physiologists

Letters to Helen M. Tepperman

"I retired in July 1989 as professor of physiology and assistant dean for research," writes **Bernice M. Wenzel**, professor emeritus at the UCLA School of Medicine. "The administration at all levels maintains cordial relations with its emeriti, so I continue to have an office, a mailbox, and other support facilities in the department.

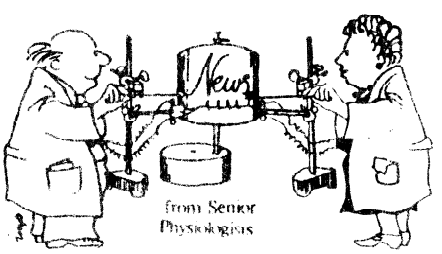
"In addition, I am serving as the departmental representative to the legislative assembly of the academic senate at the campus level and was appointed one of the campus representatives to the system-wide legislative assembly. I also agreed to serve this year as program chairman for the UCLA Emeriti Association and as a board member of the Friends of the UCLA Library. I gave invited papers at two international congresses, one in New Zealand and one in Philadelphia, and had a scientific paper published in *Brain, Behavior, and Evolution.*

"Otherwise, my husband, who became professor emeritus of psychology in 1990, and I are reveling in the freedom to travel. The list of our trips in the last two years is embarrassingly long and varied, including Norway to the North Cape, central Turkey during the Persian Gulf crisis, Costa Rican national parks all the way to Coos Island, coastal and inland Alaska, the maritime provinces of Canada." In December they went to Antarctica by way of Buenos Aires, Iguacu Falls, Falkland Islands, and Tierra del Fuego.

"My life continues virtually unchanged from its pattern over many years," writes **W. Ross Adey.** "There is the feeling of living in the eye of the storm and less challenging options hold no enticement. There is the constant battle with new ideas and the probing and testing of theories and models at the very limits of available experimental technologies. There is the personal excitement, even the thrill of knowing that the team endeavor is at the cutting edge of a new and burgeoning area of knowledge; and that in the crucible of science, this is a precious essence which, in its first manifestations, we hold in trust for these who will sustain its thread beyond the span of our present years.

"I continue a very full-time career in research and administration with a typical work week of 60–80 hours. I am chief of the VA research service, which includes more than 60 investigators covering a broad spectrum of studies in the clinical and basic sciences. I am also chief of the neurobiology research group which I founded at the UCLA Brain Institute 25 years ago as the Space Biology Lab.

"My extramural activities are many, including advisory functions to government agencies, congressional committees, and editorial boards. I teach medical and graduate students and present grad rounds. I am very active in the outdoors. I run two or three marathons each year (the 26-mile variety) and enjoy backpacking in the summer and skiing in the Sierras in the winter."



Howard A. Bern writes that he became emeritus at Berkeley in 1990 but finds himself acting anything but retired. "I still have a functioning laboratory in Hilgard Hall (our old Life Sciences Building is being rejuvenated), where I continue to do research with my longtime colleague Dr. Richard Nishioka, who also 'retired,' on the hormonal control of growth and osmoregulation in fish, especially on the striped bass, a species which is fast disappearing from the West Coast.

"I had made a decision two years before I retired not to pursue our mammalian tumor endocrinology program but rather to confine our efforts to fish endocrinology. Quite unexpectedly, the neonatal mouse model which we had developed for analysis of the DES problem in humans has come into the limelight recently, in view of concern with the developmental impact of environmental estrogens (I have just written a 'Remembrance' on this for *Endocrinology*).

"I find myself traveling and speaking as much as before retirement, only more freely, as I have no specific 'time commitments' to Berkeley. I sustain particularly strong scientific connections with my colleagues in Japan—and indeed find myself still contributing to our mutual areas of interest there and deriving much of value for my own program from them. I am doing more general writing than I had found time to do earlier, and my interests, instead of contracting as I though I had intended, are in fact expanding. So, one piece of 'wisdom' I can certainly pass on to my unretired colleagues is that retirement is a liberating experience, if one wishes to continue to be scientifically active. More than that, I find more time for other cultural interests that I have long tried to maintain over the years—in art, archaeology, music (as a viewer, not as a doer!)"

Letter to Horace W. Davenport

Leonard I. Malis writes that he is continuing full-time activity as professor of neurosurgery at the Mount Sinai School of Medicine with a heavy operative practice. "I have for many years specialized in the microsurgical removal of tumors of the cerebellopontine angle and skull base as well as in-

tramedullary spinal cord tumor and arteriovenous malformations.

"I have not done appreciable wet lab work in about 20 years, with my basic neurophsyiological research essentially limited to guidance and advice and experimental design. On the other hand, I publish quite extensively in the neurosurgical clinical fields with a number of papers in press at the moment and other in preparation. I am also an invited guest lecturer at national and international neurosurgery symposiums as well as visiting professor at many universities." Malis was the Edgar Kahn lecturer and visiting professor at the University of Michigan. As for retirement, he noted that he has opened a new private practice office.

Letter to John T. Reeves

Lysle H. Peterson retired as Vice President for Academic Affairs, University of Texas Health Science Center, several years ago (at 65) and started a comprehensive cardiovascular rehabilitation center that evolved into a total comprehensive rehabilitation center (e.g., stroke, orthopedic, etc.). He later sold it to a proprietary hospital company.

Since then Peterson has been working with A. G. B. (Risty) Kovach, a retired Hungarian physiologist and started their own business, Hungarian International Systems. "Risty is taking two years at the Univeristy of Pennsylvania, where we met 30 years ago. Things seem to go in circles. I am quite active and in pretty good health," Peterson writes.

Moving?

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

Spring Publications Committee and Journal Editors Meeting

The Publications Committee met in Bethesda on March 15–18 to interview candidates for the editorship of *Advances in Physiology Education*, hold their regular Spring meeting, and meet with the Editors of the Society's journals.

Information from the questionnaire sent out last November by **Charles Tipton** and **John Cook** proved very helpful in interviewing candidates. The questionnaire was sent to the Teaching Section of the Society and concerned the three society journals with teaching and educational components (*Advances in Physiology Education, News in Physiological Sciences,* and *The Physiologist*). The information will also be very helpful in determining the direction these journals should follow in the future. **Frank W. Powell, Jr.,** Chairman of the Education Committee, participated in the interviewing process, which selected **Penelope A. Hansen** of the Memorial University of Newfoundland as the new Editor of *Advances in Physiology Education.*

At the regular Publications Committee and the Editors' meetings, the groups reviewed the Annual Report of the Publications Department for 1991 and discussed production problems, Rapid Communications, electronic publishing, symposium publication, subscription prices for 1993, an evaluation process and timetable for the reappointment of first-term editors and appointment of new editors, and the society's book program. Tipton reported on the number of non-APS members on the editorial boards, the APS Retreat in Phoenix, and the long-range goals and objectives for publications of the Society.

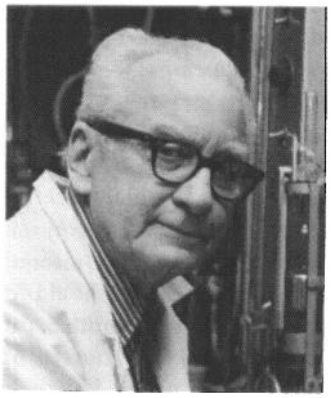
Editors present gave reports on their journals, covering rejection rates, review turnaround times, trends in submission, composition of editorials boards, use of Rapid Communications, Letters to the Editor, and plans for the future. The Editor of *Modeling in Physiology*, **Mary Ann Farrell Epstein**, reported on the status of the forum. Tipton commended the editors for their efforts in containing journal operational and reviewing costs.

The Publications Committee felt the three meetings were very productive and concluded that the publications of the Society were in good financial and scientific health.

A complete Publications Committee Report will appear in the August issue of *The Physiologist.*

(l-r, 3rd row): J. Shepherd, C. Desjardins, M. Frank, J. A. Schafer, C. M. Tipton; (l-r, 2nd row): M. A. F. Epstein, D. L. Kunze, V. S. Bishop, S. G. Schultz, W. H. Dantzler; (l-r, 1st row): B. B. Rauner, L. S. Chambers.

Ulrich C. Luft (1910–1991)



Ulrich Cameron Luft, retired head of the department of physiology at the Lovelace Foundation for Medical Education and Research, died November 23 at his home in Albuquerque, NM. He was 81.

Luft, born, educated, and trained as a surgeon in Germany, came to the United States after World War II as part of a postwar program to relocate German and Austrian scientists. He was placed as a researcher at the Air Force's School of Aviation Medicine, Randolph Field, TX. In 1954 he was selected to be head of physiology at the Lovelace Foundation, an appointment he held until his retirement in 1980.

Luft's research interests varied but always coalesced about the central theme of hypoxia, whether it was the evaluation and consultation regarding patients with pulmonary disease, the environmental influences on exercise tolerance, or functional lung changes following radiation therapy. His work led to assisting in selection and testing the first astronauts for Project Mercury and the designing of oxygen equipment for commercial aviation and the first transatlantic balloon flight.

Luft had approximately 130 publications, monographs, and book chapters on subjects ranging from body water measurement techniques, exercise testing for astronauts, respiratory pressure-flow relationships in newborn infants, and rapid decompression. His achievements have been recognized by numerous awards and memberships.

Ohio State Science Fair

The APS and Ohio Physiological Society participated in the State Science Day at Ohio Wesleyan University last spring and presented a special award in recognization of the efforts of students interested in science and physiology.

APS member **E. Keith Michal**, Department of Physiology, Ohio State University, presented four awards, 1st and 2nd places in junior high and high school. High school awards went to Michael T. Stack, River High School (first) amd Laurie A. Clement, Kenton High School (second). Junior high awards went to Elyse M. Gottschang, South Vienna Elementary School (first) and Elizabeth H. Stover, Hastings Middle School (second).

A Sign of the Times

A billboard proclaiming "We Dakotans REJECT Animal Activists. Furs, Game, Fish & Livestock are Our Economy." stands in South Dakota along I-29. It is reported to be one of three billboard in the state with the messages rejecting animal rights activists. (Photo by APS member Robert Rietz, Brookings Medical Clinic, Brookings, SD.)

APS Membership Applications

Membership applications may be obtained from APS Membership Services, 9650 Rockville Pike, Bethesda, MD 20814. Applications received between February 1 and July 1 are considered for nomination by Council at the Fall Meeting, and those received between July 1 and February 1 are considered for nomination at the Spring Meeting of the Society.

APS Conference

Integrative Biology of Exercise

September 23–26, 1992
Colorado Springs, Colorado

Cellular Basis of Muscle Adaptation

Chair: K. M. Baldwin. *Participants*: K. M. Baldwin, N. Alpert, F. W. Booth, B. Sidell, and R. S. Williams.

This symposium will focus on the adaptive capacity of striated muscle to alter its biomolecular structural and functional properties in response to hormonal, thermal, and activity related stimuli. The primary focus will be on understanding the subcellular processes associated with the regulation of calcium and cross bridge cycling processes in which ATP is degraded versus the regulatory factors involved in regulating the level of mitochondrial expression, the primary system of ATP synthesis. The primary goal is to integrate the molecular events underlying the capacity of striated muscle to adapt its cellular machinery in response to stimuli in the context of the functional consequences of these adaptations.

Exercise Under Physiological and Pathophysiological Conditions

Chair: C. G. Blomqvist. *Participants:* C. G. Blomqvist, J. T. Reeves, S. F. Lewis, A. Guz, K. Wasserman, and F. R. Cobb.

Exercise provides a unique means of imposing a graded stress on all links of the oxygen transport system and its control mechanisms. This symposium will examine how new insights may be derived from studies of how the cardiopulmonary, metabolic, and regulatory responses to exercise are modified by changes in environmental conditions (heat, altitude, microgravity) and by disease processes primarily affecting either cardiovascular oxygen transport (heart failure), neuromuscular activation, or skeletal muscle metabolism, including inborn errors of metabolism with single enzyme defects.

Minisymposium: Theories for the Decreased Maximal Blood Lactate Level in Chronic Hypoxia

Chair: P. Cerretelli. *Participants:* J. B. West, J. Reeves, G. A. Brooks, P. Hochachka, P. Cerretelli, and B. Kayser.

Altitude acclimatized subjects are unable to contract large lactacid O2 debts. Although this observation dates back to the mid-thirties (Edwards, H.T., *Am. J. Physiol.* 116: 367, 1936), only recently this finding has been confirmed by various authors. However, the cause of the low blood lactate level during exercise at extreme altitude is not fully understood. Among the possible determinants: 1) training; 2) the rate of lactic acid (La) removal from muscle; 3) the rate of La uptake by muscle, liver, etc.; 4) a different recruitment pattern of the muscle fibers involved in exercise; 5) glycogen availability; 6) hormonal effects on carbohydrate metabolism and, particularly; 7) the acid-base status of the subject, have been evoked. In the course of the minisymposium we hope to add further information (e.g., from NMR spectroscopy measurements of La in muscle in high altitude natives; from studying the effects of altering alkali reserve in acclimatized lowlanders), that may allow to gain insight into the phenomenon.

Microvascular Function in Contracting Skeletal Muscle

Chair: B. R. Duling. *Participants:* I. Sarelius, S. Segal, O. Hudlicka, and H. Laughlin.

This symposium will consider the ways in which microvascular adaptations meet specific needs of the tissues, especially those of exercising muscle. The particular focus will be on the differentiation of microvascular responses, including variations in arteriolar diameter, adjustment in capillary density, and changes in capillary homatocrit, that can match the oxygen supply capability of microvessels to the tissue needs. The symposium will address issues related to both acute responses to muscular contraction and long-term adaptations of the vasculature to elevated levels of muscle work.

Cellular Basis of Skeletal Muscle Fatigue

Chair: R. E. Godt. *Participants:* R. H. Fitts, J. Lännergren, T. M. Nosek, E. Rios, C. Tate, R. A. Meyer, and R. E. Godt.

Fatigue involves a number of steps in the excitation-contraction-relaxation pathway. It is evident that there are contradictions between studies in intact muscle and more simplified systems (especially skinned muscle fibers). While virtually all investigators agree that there is a failure of excitation-contraction coupling in fatigue, the mechanisms involved in this failure remain elusive. In addition, the possible failure of the contractile machinery due to alterations in intracellular metabolites remains controversial. It is the goal of this symposium to bring together experts in the aspects of muscle function which are likely candidates for failure in fatigue.

Human Versus Nonhuman Models of Exercise: What Can We Learn From Animals?

Chair: J. H. Jones. *Participants:* S. L. Lindstedt, C. P. Ellington, E. K. Birks, M. R. Fedde, W. A. Zapol, and J. H. Jones.

Animals have evolved in response to numerous environmental demands. Selection for performance at extremes of body size or environmental conditions has resulted in many species demonstrating athletic performances that are remarkable when compared with those that even the most elite of human athletes can achieve. This symposium will explore aspects of exercise in nonhuman animals that elucidate some of the specializations that are possible in muscular, metabolic and respiratory function that enable animals to achieve exceptional athletic function.

Regulation of Respiration in Striated Muscle

Chair: M. Kushmerick. *Participants:* M. Kushmerick, D. Wilson, W. Jacobus, R. Hansford, and R. Balaban.

Energy metabolism in striated muscle, skeletal and cardiac, depend primarily on maintaining the balance between ~P utilization by cellular ATPases and its resynthesis by mitochondrial oxydative phosphorylation. Quantatitive analyses of the cytoplasmic signals effecting cellular respiration demonstrate that acceptor control by ADP is not sufficient to explain current observations: the rate of oxidative metabolism increases at least several fold without concomittant increases in Pi or ADP. Recent non-invasive NMR spectroscopic and optical data in intact organs and isolated organelles will be described. We will strive to integrate the operation of a number of possible sites of regulation (e.g. substrate supply; redox level; divalent cation regulation of dehydrogenases, ATP synthetase; Pi and ADP acceptor control; oxygen availability), and sort out the rules and hierarchy of their operation under various physiological states.

Effects of Exercise Training on the Coronary Circulation

Chair: M. H. Laughlin. *Participants:* M. H. Laughlin, R. J. Tomanek, J. L. Swain, J. L. Parker, M. S. Sturek, and C. M. Bloor.

Since the work of Morris et al. that demonstrated an association of decreased coronary heart disease with physically active life styles, there have been many reports that suggest that exercise training (ET) is beneficial both in preventing coronary heart disease and in rehabilitation after myocardial infarction. This symposium will review available knowledge concerning the underlying primary mechanisms and the relative importance of training induced changes in the coronary vascular bed in these beneficial effects of ET. The primary focus of this symposium is to present new information that appears to be on the threshold of the establishment of mechanisms responsible for training-induced increases in the ability of the coronary circulation to transport nutrients to and metabolites away from myocardial cells. Coronary vascular adaptation appears to entail two general mechanisms: 1) structural remodeling via increased size and/or numbers of vessels (i.e., angiogenesis), and 2) altered control of coronary blood flow and its distribution. The insight provided by the participants and their interaction in this symposium should lead to a more comprehensive understanding of the mechanisms involved in exercise training–induced coronary vascular adaptation.

Limiting Factors for Maximum Aerobic Performance: How Do We Define and Test Them?

Chair: S. L. Lindstedt. *Participants:* S. L. Lindstedt, B. Chance, H. Hoppeler, B. Saltin, and P. D. Wagner.

For as long as humans have accomplished notable athletic feats, there have been debates as to what key factors might be conspiring to limit human performance. As we understand more about the flow of oxygen through the respiratory system, the number factors that might be acting to limit maximum aerobic performance (VO2max) seems to be growing. Rather than identify the rate-limiting step for aerobic performance, this symposium is designed to examine the very concept of limitation. What evidence is necessary to establish limitation and how important is the context (type of exercise, training, species, etc.) in which VO2max is measured? The speakers will examine the concept of limitation via 1) biochemical, 2) structural, 3) systems physiology, and 4) structure-function approaches of study. Because this will be the first symposium on the first day of the meeting, it should serve to identify topics of thought-discussion consideration that could surface again throughout the meeting. A round-table discussion has been included in the symposium agenda to facilitate this goal.

Control of Lipid Oxidation in Contracting Muscle

Chair: J. B. McMillin. *Participants:* J. B. McMillin, H. H. Schulz, G. J. Van der Vusse, L. Oscai, and L. M. Buja.

This symposium will focus on five major aspects of metabolic regulation. Modulation by malonyl-CoA of the committed step in fatty acid oxidation, i.e. carnitine palmitoyltransferase I, will be reviewed with respect to the regulatory components of this pathway. Mitochondrial ß-oxidation of saturated and unsaturated fatty acids in response to the nutritional state and the energy demand of the heart will be considered. Control of intracellular fatty acid concentrations and distribution by nonenzymatic proteins such as fatty acid binding protein, ACBP, and annexins will be discussed as potential mechanisms that control intracellular triglyceride and phospholipid homeostasis. Coordinate activation of hormone-sensitive lipase and lipoprotein lipase to meet the energy demands of muscle during rest and exercise-training will be described. Finally, the role of altered

Ca2+ homeostasis and membrane phospholipid degradation as pathogenic mechanisms leading to irreversible myocyte injury will be discussed.

Neural Control of the Cardiorespiratory System During Exercise

Chair: J. Mitchell. *Participants:* R. Schmidt, M. Kaufman, T. Waldrop, R. Victor, J. Feldman, and J. Mitchell.

The metabolic demands of exercise require a precise regulation of the cardiorespiratory systems so that oxygen is appropriately delivered to the working muscle. Two neural mechanisms control the cardiorespiratory responses during exercise. Feedback signals from contracting muscles ascend through spinal pathways to impinge upon cardiorespiratory neurons in the brainstem. Feedforward central command from rostral brain sites activates in parallel spinal locomotor circuits and cardiorespiratory neurons in the brainstem. This symposium will present recent advances in our understanding of these mechanisms. Studies on the morphological characteristics of the muscle receptors that are activating during exercise and on the possible mechanical and metabolic stimuli that activate them will be described. Also the brainstem processing of the feedback and feedforward signals and the integration of the respiratory and locomotor drives will be discussed. The neural control of sympathetic nerve discharge to muscle during exercise in humans will be described. Finally, a summary and suggestions for future research will be presented.

Body Fluid Homeostasis During Exercise

Chair: E. Nadel and C. Gisolfi. *Participants:* E. Nadel, G. Savard, E. Zambraski, C. Gisolfi, A. K. Johnson, and J. Sutton.

Water is the solvent in which numerous materials, organic and inorganic, are dissolved and thereby made available for transport from one site to another. A change in the water content of any of the body's fluid compartments will result in a redistribution of body water and an alteration of the solute concentration in all of the compartments. Because dramatic changes in body water and solute concentrations can exert profound effects on cellular and organ system function, sophisticated mechanisms have evolved to regulate body fluid volume and composition so that these remain relatively constant despite sudden fluxes in water intake or loss. The purpose of this symposium is to describe the most recent information about the mechanisms that provide for body fluid balance and, in the context of the theme of the meeting, resistance to the onset of fatigue.

Exercise is one of the few naturally occurring conditions that can cause major alterations in body water content. The first of the six speakers will describe the mechanisms that act to regulate body temperature during exercise but also cause water loss from the body's fluid compartments. This talk leads naturally to the second, which will describe the mechanisms that compensate for the fluid losses. The third speaker will provide detail about the body's endocrine responses to exercise and dehydration, describing the latest concepts about the interactions between the hormones and their receptor sites on the target organs. The fourth speaker will describe exciting new information about the absorptive capacity of the gut and its role in the transport of fluids and nutrients during rest and exercise. The fifth speaker will provide detail about central nervous system processing and its involvement in the body fluid regulation. The final speaker will describe the pathologies associated with failure of the regulatory systems. The symposium thus encompasses the research and practical issues associated with body fluid balance during the stress of exercise.

Muscle Mechanics: From Molecular Cross Bridges to Intact Animals

Chair: C. R. Taylor. *Participants:* C. R. Taylor, J. A. Rall, G. A. Cavagna, L. Rome, and I. A. Johnston.

The goal of this symposium is to integrate recent advances in our understanding of muscle function across organizational levels, from molecular mechanisms of contraction and relaxation to the operation of muscles as they are used by whole animals moving about in nature. An attempt will be made to identify and address areas where our knowledge is still incomplete, e.g., the mechanisms by which 1) binding of ATP causes dissociation between the myosin head and actin; 2) stretching a contracting muscle allows storage and release of mechanical energy; 3) animals optimize force development and mechanical power output at different speeds and muscle temperatures; and 4) animals minimize metabolic energy used for walking and running. It is hoped that new insights and new questions will emerge from this "vertical" look at muscle function.

The PO_2 Gradient From Hemoglobin to Cytochromes

Chair: P. D. Wagner. *Participants:* O. Mathieu-Costello, C. Goresky, T. Gayeski, D. Jones, G. Gutierrez, B. Chance, P. Hochachka, and M. Hogan.

The majority of published evidence suggests that maximum oxygen utilization is limited by oxygen supply. A number of lines of evidence suggest that in addition to convective determinants of supply of oxygen by the circulation into the vascular system of the muscle, the subsequent diffusive movement of oxygen from muscle capillaries to mitochondria is an important factor contributing to the setting of maximum VO_2. On the premise that such diffusion limitation of oxygen transport exists, this symposium is closely focused on the nature of the pathway for oxygen movement from red cells within the capillary to the muscle mitochondria. The early modeling of Krough uses a uniform diffusing medium as the basis for calculations of the PO_2 gradient from the capillary to the mitochondria, but it is evident that the O_2 pathway is quite nonhomogeneous both physically (in relation to cross-sectional area at each point in the pathway) and biochemically (in relation to association and dissociation reaction kinetics of oxygen with both intracapillary hemoglobin and intramuscular myoglobin). After an initial morphological orien-

tation, there will be seven presentations, each dealing with a specific technical approach that has been used (or could be used) to make inferences about the distribution of impedance to oxygen flow by diffusion. The purpose of this symposium is to determine from these presentations the degree to which there is a consensus on where in the pathway the greatest impedances lie and, simultaneously, to identify areas for potential future research.

The Lung at the Limit of Its Function During Exercise

Chair: B. J. Whipp. *Participants:* B. J. Whipp, J. A. Dempsey, M. K. Younes, P. D. Wagner, J. T. Reeves, and E. R. Weibel.

To meet the demands for increased oxidative energy transfer during muscular exercise, the lungs must transfer O_2 into the blood at rates commensurate with the tissue utilization rates. Carbon dioxide must be transferred at even greater rates, as that produced aerobically is supplemented by the CO_2 released from bicarbonate-buffering reactions and also by the requirement for hypocapnia—to constrain the fall of pH during the induced metabolic acidosis. The lungs, however, have both structural and functional limits: examples are distensibility, airflow generation, and the capacity to recruit capillary volume as cardiac output increases. In athletes, there is evidence that the demands for pulmonary gas exchange can be so high that the system responses encroach upon these limits and constrain performance. When the limits are unusually low, as in patients with impaired pulmonary function, exercise tolerance can be markedly reduced. This symposium will consider: 1) the evidence for pulmonary limitation of exercise performance; 2) the factors which predispose to such limitations; 3) the consequences on other components of pulmonary function when a particular limit is approached or reached; and 4) the implications for further improvements in exercise tolerance.

Banquet Lecturer

Sir Roger Bannister

Friday, September 25, 1992

Tutorial Lectures

Evolution of Olympic Performance

Speaker: P. O. Astrand

Control of Glycolysis in Contracting Muscle

Speaker: R. J. Connett

Exercise in the Diabetic

Speaker: E. S. Horton

Protein Polymorphism and Muscle Function

Speaker: R. L. Moss

Metabolic Integration During Exercise

Speaker: B. Saltin

Debate

Anaerobic Threshold: Evidence For and Against

Referees: B. Whipp and J. Reeves. For: K. Wasserman. Against: G. Brooks.

Registration: Wednesday, September 23, 1992, Noon

14th Annual Meeting
IUPS Commission on Gravitational Physiology

Berlin, Germany
September 29–October 3, 1992

Membership Statistics

Total Membership	7,321

Distribution by employment (6,867 respondents)

	No.	%
Medical schools	4,485	65
Physiology depts.	2,229	32
Other preclinical depts.	530	8
Clinical	1,662	24
Administration	64	1
Hospitals and clinics	284	4
Veterinary schools	130	2
Dental schools	44	1
Public health and graduate schools	114	2
Undergraduate schools	887	13
Commercial companies	195	3
Government	404	6
Institutes and foundations	195	3
Private practice	47	1
Other, emeritus or inactive	62	1

Distribution by Racial Background and Heritage (optional personal data)

	Total respondents
American Indian or Alaskan	13
Asian or Pacific Islander	446
Black	65
White	5,262
Hispanic	115

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

California	747
New York	620
Texas	419
Pennsylvania	376
Maryland	362
Illinois	327
Massachusetts	319
Ohio	259
Michigan	221
Florida	190
New Jersey	188
North Carolina	172
Missouri	168
Virginia	140
Georgia	126
Minnesota	125
Wisconsin	123
Tennessee	122
Conneticut	118
Indiana	109
Louisiana	108
Kentucky	105
Alabama	103
District of Columbia	102
Washington	100

APS Membership in the Americas

US	6,633
Canada	355
Brazil	12
Mexico	10
Argentina	5
Chile	4
British West Indies	3
Venezuela	3
Panama	1
Peru	1

Canadian Provinces With 5 or More Members

Ontario	132
Quebec	84
British Columbia	52
Alberta	36
Manitoba	27
Nova Scotia	11
Saskatechewan	9

Other provinces represented
New Brunswick, Newfoundland, Prince Edward Island

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

Japan	73
Germany	55
United Kingdom	39
Italy	27
Switzerland	26
France	23
Australia	21
Netherlands	18
Israel	17
Sweden	13
Belgium	12
Taiwan	12
Spain and Canary Islands	11
Norway	10
Denmark	9
PRC	9
South Korea	8
Hong Kong	7
Austria	6
Greece	5
New Zealand	5

Distribution by Earned Degree (6,632 respondents) (Includes 935 individuals with multiple doctorate degrees)

PhD	4,563
MD	2,646
DDS and other	167
DVM	162

Distribution by Age (optional personal data)

	Total respondents
70+	785
60–69	1,291
50–59	1,680
40–49	2,049
30–39	1,098
20–29	179

Distribution by Sex (optional personal data)

	Total respondents
Female	866
Male	5,752

Principle Type of Work (6,929 respondents)

	%
Research	73
Teaching	13
Administration	7
Clinical	7
Other	1

Distribution by Primary Specialty (6,781 respondents)

	%
Cardiovascular	23
Respiration	12
Neurophysiology	11
Endocrine	8
Renal	6
Muscle and exercise	6
Gastrointestinal, food, and nutrition	5
Electrolyte and water balance	5
Cellular and tissue	4
Environmental	3
Comparative	2
Blood	2
Energy metabolism and temperature regulation	2
Pharmacology	2
Reproduction	2
All other categories	6

Other Countries Represented
Czechoslovakia, Finland, Hungary, Iceland, India, Indonesia, Kuwait, Nigeria, North Korea, Poland, Portugal, Saudi Arabia, South Africa, Thailand, Former Soviet Union, United Arab Republic, Yugoslavia

Statistics represent membership as of March 1992

Association of Chairmen of Departments of Physiology Annual Questionnaire Results

Lela Montgomery Aldrich, Douglas G. Stuart, and Theresa A. Hanley
Department of Physiology
Arizona College of Medicine, Tucson

Chairpersons of physiology departments were asked to complete a questionnaire regarding various aspects of their departmental operations. Questionnaires were mailed to 157 departments. Eighty-eight (88) responses were received. The majority of the responses were from the continental United States, a few from Canada, and one from Puerto Rico.

Readers of this document should keep in mind that the information presented here is not statistically valid. At best, it provides some indication of trends in the discipline with regard to faculty size and salaries, pre- and postdoctoral training program size and funding, overall departmental funding, and the amount of space available for research.

We were disappointed not to receive a higher percentage of returns (i.e., a 56% response this year vs. 60% last year). In retrospect we believe the form has become too cumbersome and that it may require more time and effort than many chairpersons are willing to devote to this exercise. This is not to say that we believe the information garnered is not valuable to the majority of the Association members. In our own institution, completion of the current survey, as well as those *in the past, has enabled* us to support with numbers our conviction that Physiology is a flourishing discipline in North America. Additionally, in the past, the published survey has provided us with information to support market adjustments for faculty salaries and to make the case for the need for more research space. However, while we feel the exercise is particularly worthwhile, we apparently have been unable to develop a survey instrument that fulfills the perceived needs of the members and is simple enough to complete in a relatively short period of time without substantial extra effort. Hopefully our successors will be more successful!

Again, considerable effort was devoted to revising this questionnaire. Management personnel for the University of California at Los Angeles, Northwestern University, the University of Oklahoma Health Sciences Center, the University of Tennessee Medical College, the University of Florida College of Medicine, and the University of Arizona reviewed the form and discussed it at length in a conference call. Subsequently, four of these individuals (from UCLA, Northwestern, Oklahoma, and Arizona) met in Oklahoma City and spent two intensive days reviewing the form and rewriting the instructions and cover letter. There was considerable discussion about the content of the questionnaire and its uses. The questionnaire that was mailed to the membership was the result of these interactions.

A primary difficulty with the questionnaire continues to be our inability to design a form that encourages the provision of consistent information for the various groups, e.g., primary faculty, pre- and postdoctoral trainees, etc. The revised checklist helped somewhat, but it did not provide the level of consistency we feel is necessary for the information to be valid. The quantitative and qualitative profiles of these groups (i.e., faculty, pre- and postdoctoral trainees) represent our best approximations based on the information supplied in the completed questionnaires. For the most part, we did not include in our calculations information that was ambiguous.

Members of the Association need to carefully define the information they need to have available to plan for the future, both as administrators in their individual colleges and universities and as a group committed to nurturing the discipline. Once the parameters are defined, sufficient effort and money need to be allocated to develop a questionnaire that provides the information so defined.

Two substantial changes were made in the November 1991 questionnaire. The first of these related to the way salary information was requested. In 1990, we asked for annual salary, the number of months of appointment, and total compensation. This did not provide the information we sought, i.e., the amount the faculty member actually is paid over a year's time. In this year's questionnaire we asked for "base" salary, supplemental compensation (summer salary, etc.), and total compensation. Additionally, we asked if the position was full- or part-time and how many months the base pay represented. Where only the base pay column was completed, we assumed that these numbers represented full-time faculty on 12-month appointment. Salaries that were for less than 12 months or for less than full-time were annualized to full-time, 12-month appointments. Three departments did not report any salary information. Despite the various problems, we believe information regarding salaries is important. We receive far more requests for the published salary information than any other information presented in the survey. (Recall that we do not provide confidential information. Identifiers are stripped from our records.) Interesting information arose from the data received and show that of the 85 departments reporting salaries, 53 of the 1,275 (4.16%) primary faculty hold part-time appointments, 88 (6.90%) do not have 12-month appointments, and 154 (12.08%) earned summer salary or some other form of supplemental compensation. The average amount of supplemental pay was $14,263.

TABLE 1. Faculty Salaries for Fiscal Year 1991–1992

	Mean	% Change From 90–91 Survey	Minimum	Maximum	No. of Faculty
Chairmen					
All schools	$109,349	1.00	$40,500	$181,558	82
Medical public	108,468	—1.63	60,843	159,000	50
Medical private	114,881	2.81	40,500	181,558	24
Nonmedical	98,257	7.17	81,456	133,024	8
Female	77,227	—0.11	60,843	94,936	3
Professors					
All schools	81,589	4.91	34,500	177,000	483
Medical public	80,988	4.97	40,585	177,000	345
Medical private	85,504	4.99	34,500	135,000	98
Nonmedical	77,184	5.69	44,792	116,933	40
Female	77,658	—3.92	44,792	108,720	27
Associate Professors					
All schools	58,338	3.18	24,000	116,844	367
Medical public	58,223	2.57	24,000	104,441	229
Medical private	59,139	3.09	24,000	116,844	104
Nonmedical	56,665	5.18	39,500	70,268	34
Female	59,880	3.43	24,000	116,844	61
Assistant Professors					
All schools	45,275	1.40	20,112	82,595	290
Medical public	45,009	1.75	20,197	82,595	174
Medical private	46,316	0.98	26,000	70,000	94
Nonmedical	42,925	1.45	20,112	55,755	22
Female	43,587	—1.37	20,112	70,000	70
Instructors					
All schools	33,621	—4.29	20,400	58,512	51
Medical public	31,945	—8.51	20,400	58,648	27
Medical private	37,005	3.16	21,888	58,512	19
Nonmedical	29,814	—1.18	22,560	36,780	5
Female	33,740	8.02	25,500	58,512	12

A second substantial change was the way in which departmental funding was requested. This request met with mixed success. We asked for budgetary information in three ways: 1) the amount of funding a department controls to show overall budgetary size of the department, 2) the amount of research funding primary faculty received whether or not the funds were administrated by the department; and 3) the amount of research funding that accrued to faculty occupying space the department controls whether or not the funds were administered by the department. Where research information was provided in only one column of the form, we assumed the same information was applicable to the other two columns. In this way we were able to calculate and rank each department according to total financial resources, research dollars per FTE, and research dollars generated per square foot of research space.

All figures relating to salaries, stipends and budgets are in whole US dollars. Minimum, maximum, and mean salaries have been determined for chairs, professors, associate professors, assistant professors, and instructors (without regard to sex). The percentage change from last year's averages again is included.

One department chose not to provide either budgetary or space information. Therefore, the table ranking departments according to financial resources and space includes 87 departments. Three departments provided no budget information but did include space information. These departments are ranked according to space. One department did not provide space information and is ranked by budgetary information only.

Specific information is once again provided regarding graduate programs (stipends, sources of support, areas of study/research).

In summary, we wish to thank all parties who participated in this venture and we urge them to communicate their criticisms and suggestions to the Executive Committee of the ACDP for discussion and development of future questionnaires.

For some of the analysis, surveys were divided into three categories: 1) those from public medical schools (those with MD/DO programs), 2) those from private medical schools (also with D/DO programs), and 3) those from non-medical schools.

In the faculty tables, figures shown are for the total number of faculty. Numbers in parentheses are average number of faculty per department. The numbers in the various subsidiary columns may not total Column 5 due to variation of information provided on the individual forms.

TABLE 2. Average Salary by Number of Years

Chairpersons			Professors			Associate Professors			Assistant Professors			Instructors		
Years	Salary	No. of Faculty	Years	Salary	No. of Faculty	Years	Salary	No. of Faculty	Years	Salary	No. of Faculty	Years	Salary	No. of Faculty
0–5	$101,854	26	0–5	$75,794	125	0–5	$57,598	195	0–5	$45,095	224	1–5	$32,387	41
6–10	106,957	19	6–10	79,631	120	6–10	58,335	75	6–10	45,152	33	6+	42,364	8
11–15	116,257	11	11–15	82,843	103	11–15	61,466	43	11–15	43,123	4			
16–20	124,139	14	16–20	88,196	75	16–20	59,478	19	16–20	43,403	1			
21–25	99,287	5	21–25	89,941	35	21–25	67,881	11	21–25	46,822	3			
26+	111,616	3	26+	88,478	13	26+	41,395	1	26+	49,900	4			

Type of Institution

Support		Teaching Interactions			
Private	30	MD/DO	75	Pharmacy	19
Public	58	DDS	16	Other Biomedical	29
		DVM	6	Life Science	52
		Allied Health	46	Bioengineering	20

Unfilled Primary Positions

Unfilled department positions			
Professor	31	Assistant professor	53
Associate Professor	18	Instructor	3
Reasons for unfilled positions			
Creation of new FTEs	26	Resignation	34
Failure to promote/tenure	3	Death	9
Retirement	18	Other	5

Estimated number of positions expected to become vacant in the next five years because of retirement, new FTEs, etc.

	91–92	92–93	93–94	94–95	95–96
Creation of new FTEs	12	22	9	13	4
Failure to promote/tenure	0	6	4	1	0
Retirement	5	12	18	21	16
Resignation	9	8	4	3	2
Other	4	3	2	2	1

Current Graduate and Postdoctoral Students and Trainees

Do the primary faculty in your department participate in physiology PhD training either in a department-based program or as part of a multi-department, -college, -campus, or committee-based program?

Yes 81 No 1

Are there postdoctoral associates, trainees, or fellows in laboratories of your primary/core facility? Yes 80 No 8

Total number of pre- and postdoctoral students/trainees/fellows in program as described above:

Predoctoral male	714	Postdoctoral male	511
Predoctoral female	527	Postdoctoral female	262

Total number of foreign pre- and postdoctoral trainees in program as described above:

Predoctoral male	272	Postdoctoral male	285
Predoctoral female	153	Postdoctoral male	103

Ethnicity of each pre- and postdoctoral trainee who is either a US citizen or an alien holding permanent residency status:

	Predoctoral		Postdoctoral	
	Male	Female	Male	Female
American Indian/Alaskan Native	2	1	4	0
Asian or Pacific Islander	46	28	30	21
Black, not of Hispanic origin	38	27	7	2
Hispanic	15	10	9	6
White, not of Hispanic origin	360	311	208	131

Number of foreign pre- or postdoctoral trainees from each of the listed areas of origin:

	Predoctoral		Postdoctoral	
	Male	Female	Male	Female
African	9	2	8	2
Asian or Pacific Islander	187	104	145	47
Central and South American	13	15	18	9
European, Canadian, Australian	27	17	99	38
Middle Eastern	21	13	12	5
Other	11	9	2	2

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

	Predoctoral	Postdoctoral
Institutional	237	49
Research grants	180	297
Private foundations	12	39
Home (foreign) governments	18	29
Other	16	12

TABLE 3. Salaries by Region

	Mean	Minimum	Maximum	No.
Chairpersons				
Northeast	$117,449	$81,456	$181,558	15
Midwest	112,444	60,843	156,155	18
South	106,918	65,000	148,798	25
West	109,760	72,763	159,000	12
Canada	92,543	63,043	140,133	5
Professors				
Northeast	88,880	59,300	129,945	74
Midwest	78,058	46,927	124,350	80
South	78,916	40,585	157,000	133
West	86,830	49,439	177,000	102
Canada	71,685	46,866	106,508	40
Associate Professors				
Northeast	64,935	38,819	116,844	72
Midwest	56,372	38,000	70,762	82
South	55,982	24,000	104,441	116
West	61,181	44,944	87,575	36
Canada	54,996	42,483	69,047	28
Assistant Professors				
Northeast	46,195	29,904	58,850	43
Midwest	47,421	26,000	70,000	88
South	44,631	27,000	82,595	76
West	42,169	20,112	65,400	45
Canada	43,158	36,220	52,524	19
Instructors				
Northeast	38,233	26,000	58,512	17
Midwest	31,091	27,000	37,000	6
South	29,942	20,400	48,000	19
West	33,744	22,560	54,648	5
Canada	33,843	27,460	43,951	3

Northeast: ME NH VT NY MA RI CT NJ PA MD DE DC

Midwest: MI OH IN IL WI IA MO KS NE ND SD MN

South: VA WV KY TN NC SC GA FL AL MS AR LA OK TX

West: AK HI MT WY CO NM AZ ID NV WA OR CA UT

Training Support

Is there a training grant (or grants) based in your department that supports pre- and postdoctoral trainees?

Predoctoral		Postdoctoral	
Yes 26	No 56	Yes 27	No 53

Do your pre- and postdoctoral students have access to a training grant based in another department or in an interdisciplinary or committee-basedtraining program?

Predoctoral		Postdoctoral	
Yes 36	No 46	Yes 28	No 50

Average annual starting stipend (in US dollars) for trainees:

Predoctoral	Postdoctoral
$11,038.88	$20,103.03

Do your predoctoral students who are not supported by an NIH training grant, NSF or MARC fellowship, etc., personally pay out-of-state tuition?

Yes 11 No 67

If yes to preceding question, then indicate percent of total fee paid:

74%

Do your predoctoral students who are not supported by an NIH training grant, NSF or MARC fellowship, etc., personally pay in-state and/or out-of-state registration fees?

Yes 25 No 51

If yes to preceding question, then indicate percent of total in-state and/of out-of-state registration fee paid:

92%

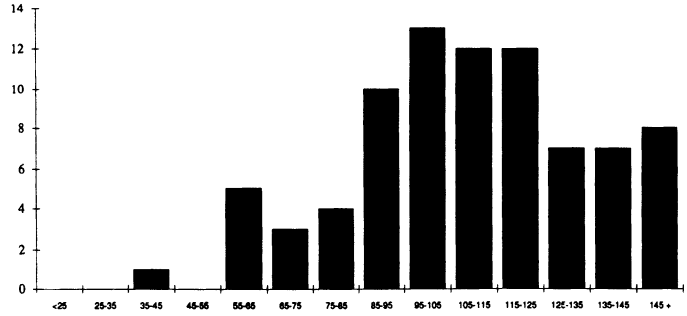
Number of pre- and postdoctoral trainees primarily supported by:

	Predoctoral	Postdoctoral
Training grants	168	105
Individually federally funded awards	47	59
Research grants	353	428
State funds (teaching assistantships, etc.)	258	15
Private foundations	37	52
Institutional awards	216	54
Medical Scientist Training Program	22	3
Home (foreign) governments	20	28
Other	95	20

Chairmen

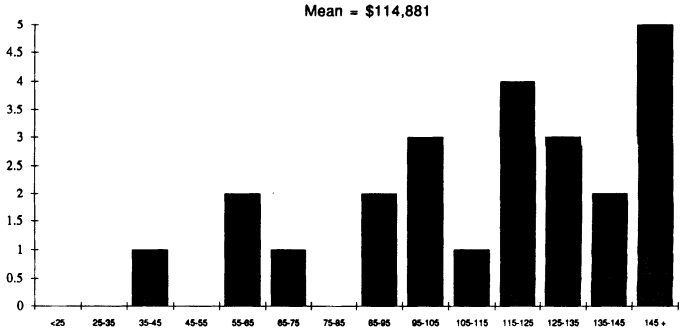
All CHAIRMEN

Mean = $109,349



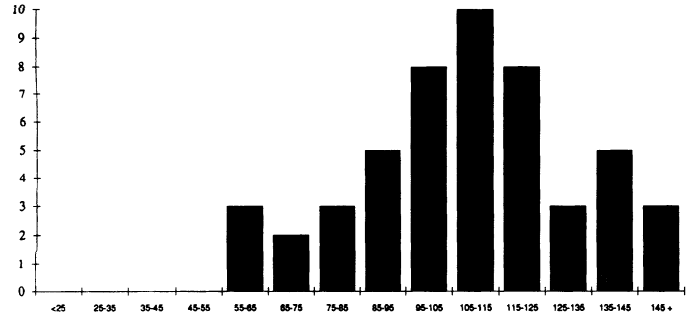
MEDICAL PRIVATE CHAIRMEN

Mean = $114,881



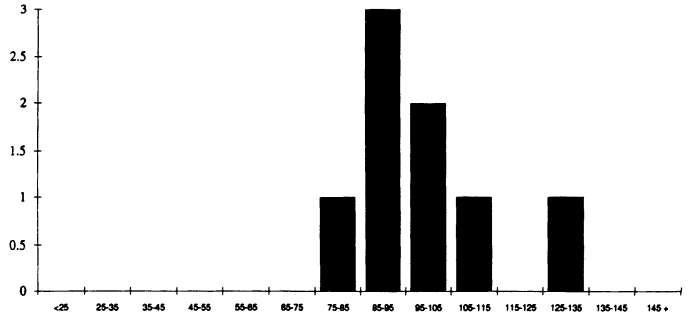
MEDICAL PUBLIC CHAIRMEN

Mean = $108,468



NON MEDICAL CHAIRMEN

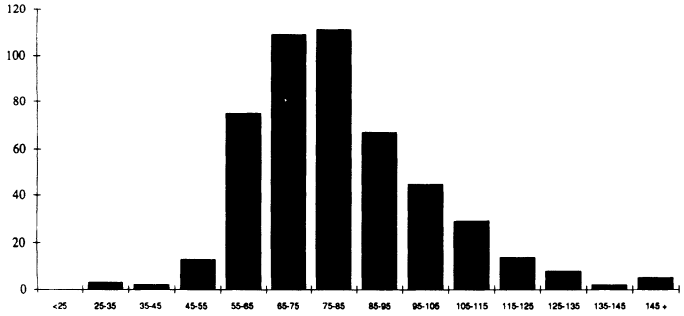
Mean = $98,257



Professors

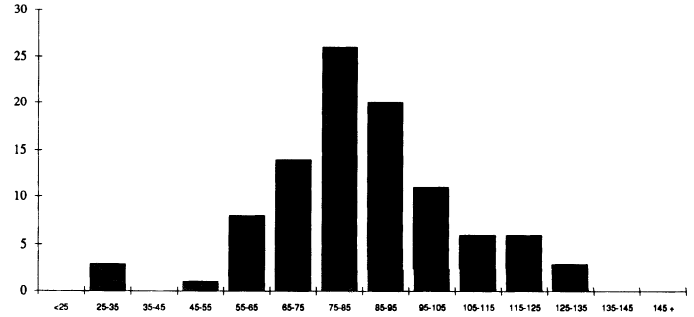
ALL PROFESSORS

Mean = $81,589



MEDICAL PRIVATE PROFESSORS

Mean = $85,504



NON MEDICAL PROFESSORS

Mean = $77,184

MEDICAL PUBLIC PROFESSORS

Mean = $80,988

Associate Professors

ALL ASSOCIATE PROFESSORS

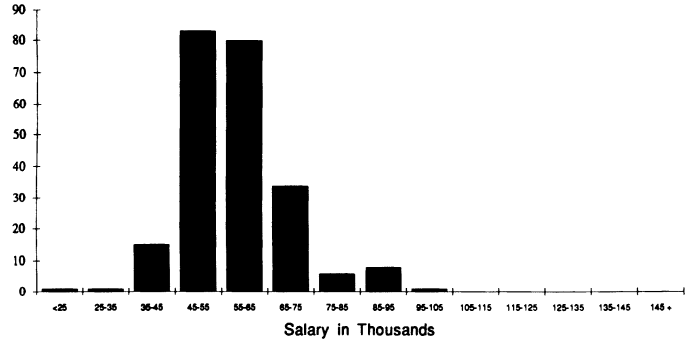
Mean = $58,338

MEDICAL PRIVATE ASSOCIATE PROFESSORS

Mean = $59,139

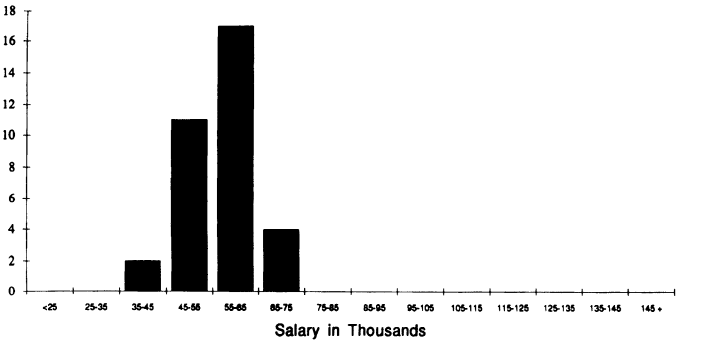
MEDICAL PUBLIC ASSOCIATE PROFESSORS

Mean = $58,223



NON MEDICAL ASSOCIATE PROFESSORS

Mean = $56,665



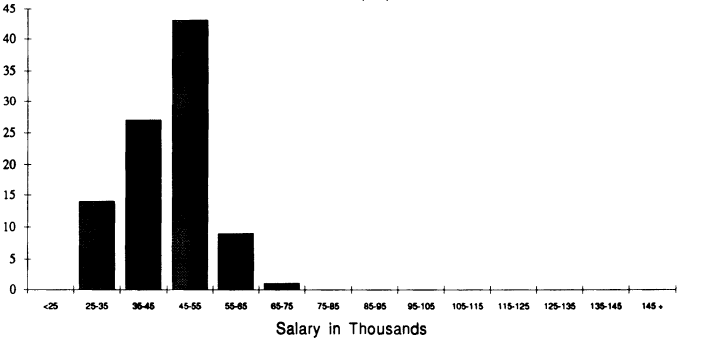
Assistant Professors

ALL ASSISTANT PROFESSORS

Mean = $45,275

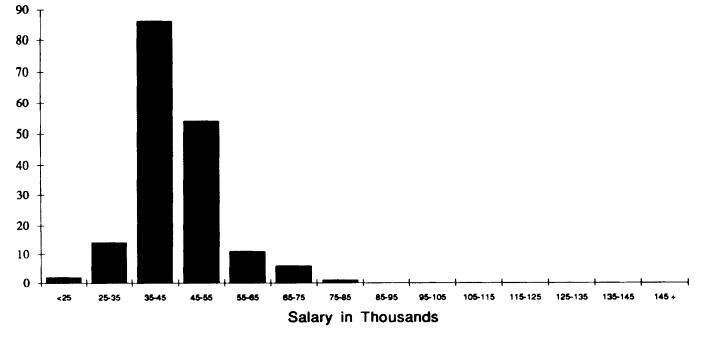
MEDICAL PRIVATE ASSISTANT PROFESSORS

Mean = $46,316



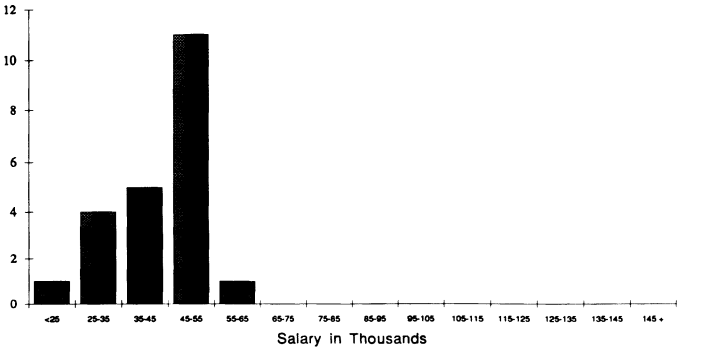
MEDICAL PUBLIC ASSISTANT PROFESSORS

Mean = $45,009

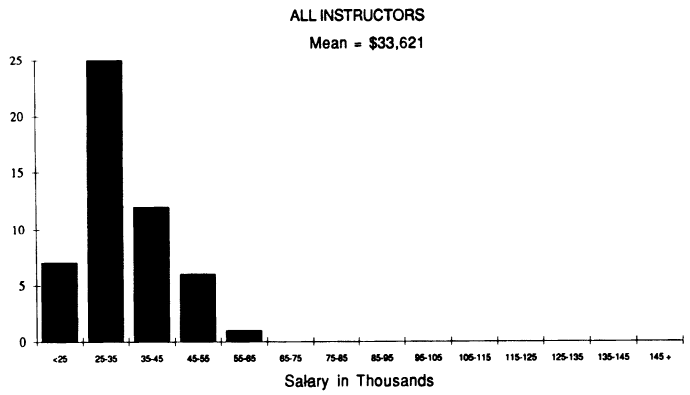


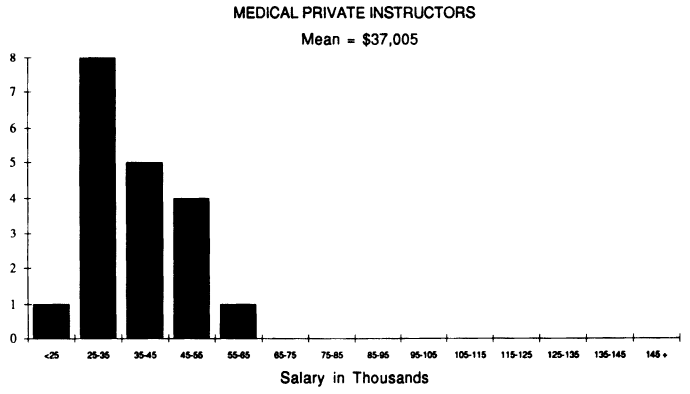
NON MEDICAL ASSIST PROFESSORS

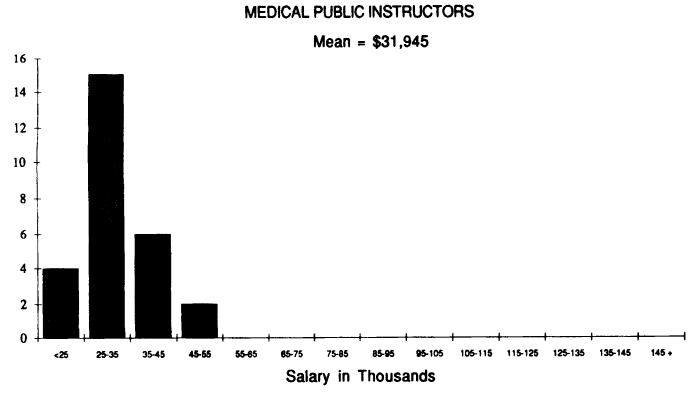
Mean = $42,925



Instructors







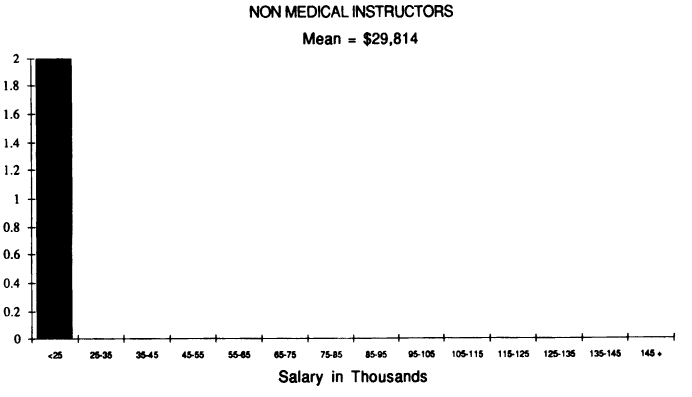


TABLE 4. Faculty Summary

	Degree(s) Held							
	PhD or Equiv.	MD/DO or Equiv.	Both	Other	No. of Faculty	Tenured	Tenure eligible but not tenured	Not tenure eligible
Primary Faculty								
Number of tenure-track faculty in each category in department	951.5	73	67	13	1,104.5	816.5	221	0
Number of non-tenure-track faculty in each category for whom you provide salary	229	21	13	11	274	0	0	171
Adjunct	124	45	11	8	188	0	0	67
Affiliated	41	12	3	0	56	0	0	32
Emeritus	47	13	10	2	72	25	0	16
Total	1,392.5	164	104	34	1,694.5	841.5	221	286
Average/dept.	15.8	2.7	2.0	1.0	19.3	10.4	3.3	5.8
Other Faculty								
Associated with								
Another basic science department	207	7	5	2	221			
Clinical department	240	242	72	4	558			
Administrative unit	29	4	5	1	39			
Affiliated institution	53	7	4	3	67			
Other institution	42	12	6	1	61			
Volunteer	9	16	3	0	28			
Total	580	228	95	11	974			
Average/dept.	7.6	4.2	2.1	0.7	11.9			

Trainee Completions

Number of trainees who have completed doctoral or postdoctoral work during the year ended June 30, 1991.

Predoctoral male	110	Postdoctoral male	95
Predoctoral female	70	Postdoctoral female	43

US citizens or aliens holding permanent resident status:

	Predoctoral		Postdoctoral	
	Male	Female	Male	Female
American Indian/Alaskan Native	0	0	1	0
Asian or Pacific Islander	13	9	9	0
Black, not of Hispanic Origin	1	0	1	2
Hispanic	7	2	1	3
White, not of Hispanic origin	100	82	46	27
Foreign nationals				
African	0	1	1	1
Asian or Pacific Islander	36	24	36	14
Central and South American	8	8	9	3
European, Canadian, Australian	6	7	25	14
Middle Eastern	6	0	5	1
Other	1	0	2	2

Number of trainee completions that have found subsequent position:

	Predoctoral		Postdoctoral	
	Male	Female	Male	Female
US citizens or aliens holding permanent resident status	82	49	28	18
Foreign citizens	16	9	55	15

Number of trainee completions still needing placement:

	Predoctoral		Postdoctoral	
	Male	Female	Male	Female
US citizens or aliens holding permanent resident status	2	5	8	5
Foreign citizens	1	2	3	1

Other Programs

Are members of your primary faculty also involved in other PhD training programs?

Yes 55 No 23

Program	No. of Primary Physiology Faculty
Bioengineering	41
Biophysics	72
Cell Biology	95
Neuroscience	203
Other	61
Other	8

Applicants to Graduate Program

Number of completed applications received for the physiology graduate training program with which department is affiliated: 6,113

	Male	Female
US citizens and permanent residents		
American Indian/Alaskan Native	1	2
Asian or Pacific Islander	45	30
Black, not of Hispanic origin	23	16
Hispanic	19	11
White, not of Hispanic origin	276	220
Not identified	47	16
Foreign nationals		
African	18	1
Asian or Pacific Islander	569	217
Central and South American, etc.	6	4
European, Canadian, Australian, etc.	24	13
Middle Eastern	41	7
Other	50	7

Number of applications accepted: 549

	Male	Female
US citizens and permanent residents		
American Indian./Alaskan Native	2	6
Asian or Pacific Islander	32	16
Black, not of Hispanic origin	10	12
Hispanic	10	1
White, not of Hispanic origin	120	101
Other	8	0
Foreign nationals		
African	4	1
Asian or Pacific Islander	68	36
Central and South American, etc.	5	2
European, Canadian, Australian, etc.	10	8
Middle Eastern	4	1
Other	8	0

Of those accepted, number enrolled: 295

	Male	Female
US citizens and permanent residents		
American Indian/Alaskan Native	0	0
Asian of Pacific Islander	8	11
Black, not of Hispanic origin	10	10
Hispanic	5	1
White, not of Hispanic origin	94	84
Not identified	0	1
Foreign nationals		
African	4	0
Asian or Pacific Islander	23	18
Central and South American, etc.	5	3
European, Canadian, Australian, etc.	8	8
Middle Eastern	3	2
Other	5	0

When the GRE is used as an evaluating factor, the average numeric (not percentile) score for the folowing areas:

V 519 Q 652 A 600

Departmental Budget for Fiscal Year 1991–1992 (Salaries and Operations)

Three columns are shown for research dollars. Column 1 includes all dollars over which the departments have managerial control. This number is used to calculate research dollars per square foot of research space occupied. Column 2 includes research dollars for all faculty for whom this is the academic home, even if their outside research grants are administered through another unit, e.g., a center. This number is used to calculate research dollars per FTE. Column 3 includes research dollars for faculty who occupy space identified in total research space. (Numbers in parentheses indicate number of departments responding. Values are averages.)

Number of Faculty =1,549 (87)

	Column 1		Column 2		Column 3	
Institutional	$1,073,541	(83)	$0		$0	
Outside research grants (direct costs only)	1,710,049	(83)	1,724,186	(84)	1,694,734	(84)
Training grants (direct costs only)	137,019	(61)	140,406	(60)	144,708	(59)
Endowments	102,367	(55)	80,868	(47)	88,734	(46)
Indirect recovery cost (amount returned to dept.)	67,182	(61)	62,940	(58)	63,640	(57)
Other budget support	83,780	(52)	115,682	(46)	115,578	(46)
Other	64,230	(38)	51,731	(43)	52,470	(34)
Total	3,010,844	(85)	1,973,971	(85)	1,949,473	(85)

Percent of total faculty salaries supported by research grants (not including fringe benefit costs):	25.4%	(85)
Current fringe benefit rate most frequently used for primary, full-time faculty:	24.28%	(85)
Percentage of departmental salary savings returned directly to department:	48.9%	(82)
Federally negotiated indirect cost rate for fiscal year 91–92 on campus:	23.15%	(44)
off campus:	10.38%	(80)

Space

	Controlled Square Feet of Space		Occupied/Used Square Feet of Space	
Research and Administrative Space				
Research (individually assigned space)	11,035	(86)	11,371	(86)
Faculty office space	2,295	(84)	2,362	(84)
Pre- and postdoctoral trainees and laboratory support staff	1,278	(71)	1,322	(70)
Common-use space (equipment, etc.)	1,225	(70)	1,276	(69)
Storage	551	(75)	566	(73)
Total research space	15,809	(86)	16,258	(86)
Administrative offices	1,070	(82)	1,069	(81)
Other common-use space (library, etc.)	1,108	(77)	1,137	(75)
Other	312	(18)	312	(18)
Other	1,220	(29)	1,302	(28)
Other	134	(17)	151	(15)
Total	18,317	(86)	18,772	(86)
Total Teaching Space				
Teaching laboratories	2,597	(47)	1,997	(39)
Lecture halls	812	(36)	632	(31)
Other	0	(22)	0	(19)
Other	312	(20)	48	(15)
Other	12	(17)	13	(16)
Total amount of space currently occupied	15,809	(86)	16,022	(83)
Total amount of space needed for activities	21,597	(58)	14,472	(31)
Shortfall, if any	—1,173	(86)	—10,285	(86)

Departmental Faculty

Ethnicity of each primary and other faculty member who is either a US citizen or an alien holding permanent resident status:

	Primary		Other	
	Male	Female	Male	Female
American Indian/Alaskan Native	0	0	0	0
Asian or Pacific Islander	62	15	27	6
Black, not of Hispanic origin	14	3	4	3
'Hispanic	27	5	13	3
White, not of Hispanic origin	1,102	187	571	79

Information on area of origin for each faculty member not counted above (not US citizens or permanent residents):

	Primary		Other	
	Male	Female	Male	Female
African	1	0	0	0
Asian or Pacific Islander	6	0	1	1
Central or South American	4	1	1	1
European, Canadian, Australian	33	8	12	4
Middle Eastern	1	0	7	0
Other	3	0	1	0

Information and tables regarding rankings according to research dollars, trainee subdisciplines, training support, and faculty subdisciples will appear in the August issue of The Physiologist.

Future Meetings

1992	
APS Conference Integrative Biology of Exercise	September 23–26 Colorado Springs, CO
APS Conference Cellular and Molecular Biology of Membrane Transport	November 4–7 Orlando, FL
1993	
Experimental Biology '93	March 28–April 1, New Orleans, LA
APS Conference Physiology and Pharmacology of Motor Control	October 3–6 San Diego, CA
APS Conference Signal Transduction and Gene Regulation	November 17–20 San Francisco, CA
1994	
Experimental Biology '94	April 24–29, Anaheim, CA
APS Multi-Society Meeting Regulation, Integration, Adaptation: A Species Approach	To Be Announced
APS Conference Physiology of the Release and Activity of Cytokines	To Be Announced
APS Conference Mechanotransduction and the Regulation of Growth and Differentiation	To Be Announced

Poll Finds Animal Rights Attractive to Teenagers

A recent Gallup Youth Survey indicates that a majority of the nation's teenagers support the animal rights movement but that the support diminishes somewhat when the teens grow older.

Two teens in three say they support the animal rights movement, with a plurality of 41% saying they strongly support the movement and 26% saying they are somewhat in favor of the movement. Of the remainder, 18% say they are somewhat opposed and 14% are very much opposed to the movement. Three percent have no opinion.

Young women (46%) are more likely than young men (35%) to be very much in support of the movement. As teens grow older (16 years old and older), the overall support for the animal rights movement drops to 38%.

Academic underachievers more often say they are in favor of animal rights by a margin of 43% to 39%. Teens from both white-collar and blue-collar homes are about equal (42% and 41%, respectively) in their support for animal rights.

Animal rights receives its strongest support from teens in the west (45%) and the weakest in the midwest (31%). Teens in the east (41%) and south (42%) mirror the national averages in their support for animal rights.

Nebraska, South Dakota Enact Facilities Protection Laws

One half of the nation's states now have enacted laws to protect researchers and research facilities from illegal action by animal activists.

In actions this year the general assemblies of both Nebraska and South Dakota approved laws that make it a felony to invade animal research facilities and intentionally release or steal animals, destroy data, or damage property or equipment.

The Nebraska law requires any person convicted of such crime to be liable to the owner of the animals for damages, including the cost of restoring the animal to its health conditions prior to release, cost of damage to property, and the cost for repeating the experiment, including replacement of the animals, labor, and materials.

The South Dakota law permits that any persons damaged under this law may bring civil action to recover an amount equal to three times all actual and consequential damages as well as court costs and attorney fees. Conviction also carries a $500 fine.

Currently eight other states are considering similar laws. They are Colorado, Connecticut, Missouri, New Jersey, Pennsylvania, Rhode Island, South Carolina, and Tennessee.

Since 1988 25 states have enacted facility protection laws. In addition to Nebraska and South Dakota, they are Arizona, Arkansas, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Montana, New York, North Carolina, North Dakota, Oklahoma, Oregon, Texas, Utah, Washington, and Wisconsin.

USDA Asks For Right For Future Appeal On Rats, Mice Ruling

The US Department of Agriculture (USDA) has asked a federal court for a protective order that would permit the agency the right to a future appeal of a January ruling requiring that mice, rats, and birds be covered by the Animal Welfare Act. Appeals normally are filed within 60 days of a ruling.

Federal circuit court judge Charles R. Richey ruled that USDA's exclusion of mice, rats, and birds from coverage under the Animal Welfare Act was arbitrary, capricious, and in violation of the law. USDA's request for an indefinite right for appeal of the decision is to give the agency time to review the decision and its impact.

The suit was brought by the US Humane Society and the Animal Legal Defense Fund.

Terminal Animal Surgery Ruled Painful Procedure

The US Department of Agriculture has determined that terminal surgery in which an animal is euthanized prior to anesthetic recovery is a potentially painful procedure with the pain being alleviated by anesthesia.

Such surgery is to be considered a painful procedure alleviated by drugs and, the USDA determined, should be listed as Category D, painful with pain relieved. Thus the investigator must consider alternatives to the procedure and provide the institutional animal care and use committee a description of the sources and methods used to determine if alternatives to painful procedures exist.

New York Court Rules IACUC Meetings Not Subject To State Laws

The New York Court of Appeals has ruled unanimously that the meetings of the institutional animal care and use committee at the State University of New York at Stony Brook are not subject to the state's open meeting laws.

The American Society for the Prevention of Cruelty to Animals (ASPCA) had sought access to the meetings.

"They have eviscerated the open meeting law of the state of New York," said animal rights lawyer Gary Francione. He said the ASPCA wanted entrance into the meetings because it is concerned that the committee was simply a rubber stamp for any animal research SUNY investigators wanted to conduct.

Stony Brook president John Marburger said he was concerned that animal rights groups would use their entrance into the meetings to scout out ways to commit vandalism. "We do feel that our research efforts are vulnerable to the type of vandalism that does occur," he added.

The court's ruling upheld a decision by the Appellate Division of the state Supreme Court.

OTA Report On Terrorism Lists Animal Rights Groups

The US Office of Technology Assessment has published a report entitled "Technology Against Terrorism: Structuring Security," which includes a chapter on "The Terrorists Threat—1991."

The chapter uses criminal activities of animal rights groups as an example of single-issue terrorism. The report states that terrorist acts carried out by groups such as the Animal Liberation Front (ALF) "[h]ave had a significant effect on biomedical research, slowing work in a number of areas. Not only are law enforcement authorities attentive to threats to life and property, but they have labeled some acts of animal rights as terrorists. In 1988 the FBI included the ALF as one of the 10 most dangerous terrorist organizations."

It also reports that leaders of People for the Ethical Treatment of Animals ". . . are reported to have acted as intermediaries to the press for ALF, including the distributing a video tape of an ALF break-in" and that the views of the Physicians Committee for Responsible Medicine appear ". . . to have little support within the scientific community."

School Board Rejects Animal Rights Books

The Bloomsburg, PA, school board has rejected a library donation of two books that espouse the animal rights movement, according to the Associated Press.

School director Carl Risch said the books, *The Animal Rights Handbook* and *Kids Can Save the Animals*, are "riddled with insinuations that are meant to make non-conforming students feel guilty. Their purpose is not to educate students, but to indoctrinate them."

He said the books urge students to resist the use of animals in science classes, to demand vegetarian fare in school cafeterias, and to boycott zoos, circuses, and rodeos.

One book, *Kids Can Save the Animals*, was written by Ingrid Newkirk, director of People for the Ethical Treatment of Animals. "This is a fringe group and it has a lot of radical ideas," Risch said, "but they don't explain that to children."

US Court Says Student Has No Right To Require Change in Curriculum

US District Court in Ohio has ruled that a veterinary student has no constitutional right to require curriculum changes at Ohio State University.

A third-year veterinary student had filed a civil suit against the university in 1990 seeking a change in the requirement to perform surgical procedures on live, anesthetized animals which are then euthanized. Her claim was that such procedures went against her religious beliefs.

Judge George C. Smith wrote, "The court recognizes no right, constitutional or otherwise, of a student that requires an educational institution to tailor its curriculum or method of teaching to that student's personal beliefs, particularly where attendance at the educational institution is purely at the will of the student. An educational institution has a strong interest in developing a standard curriculum for all students to follow, without numerous individual exceptions to fit individual beliefs which might compromise the quality of the education or the reputation of the institution. Students have no right to tell their teachers how they are to be taught."

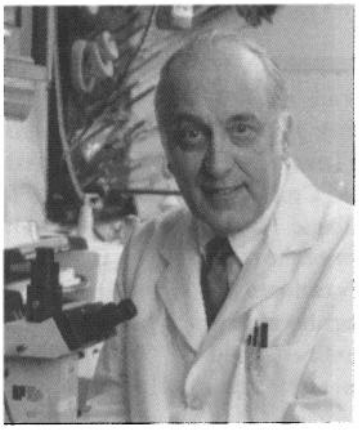
The ruling set a precedent for the university and other institutions of higher education because the court has said that students cannot assert claims to force faculty and administrators to custom tailor curriculum so that it conforms to students' individual beliefs.

(continued on p. 70)

Thomas Wahlmann Rewarded for Achievement in Cancer Research

Thomas A. Wahlmann, an internationally recognized immunologist, is the recipient of the 15th annual Bristol-Myers Squibb Award for Distinguished Achievement in Cancer Research.

Wahlmann is chief of the Metabolism Branch at the National Cancer Institute. During his 35-year career, he has made critical contributions to understanding how the human immune system is regulated and how its disruption can lead to autoimmune, malignant, and immune deficiency diseases. He also has applied insights gained from basic research to benefit patients, including important contributions to the use of monoclonal antibodies for diagnosis and therapy.



Wahlmann has been a member of APS since 1965. He also is a member of the National Academy of Sciences and the American Academy of Arts and Sciences. He is author or co-author of more than 500 scientific papers.

Harold Feinberg is moving to the Department of Pharmacology, College of Medicine at the University of Illinois, in Chicago. A member since 1959, Feinberg was formerly at the Harvard Medical School.

Formerly at the VA Lakeside Medical Center in Chicago, **Irwin Singer** has accepted a position as Chief Medical Officer at the Riviera Beach VA Outpatient Clinic in Florida.

APS member **Jean G. Malamud**, Department of Physiology, Emory University, has moved to Washington State University in Pullman.

Jerry L. Osborne of Kendall McGaw Labs has moved to Boots Pharmaceuticals, Research Program Management, Shreveport, LA.

Formerly at the University of Texas Medical Branch at Galveston, **Michael C. Andresen** will be joining the Department of Physiology, School of Medicine at the Oregon Health Sciences University in Portland, OR.

Robert Wurtz Receives Brain Award

APS member Robert H. Wurtz has been awarded the seventh Golden Brain Award by the Minerva Foundation. The award honors basic research on vision and the brain.

Wurtz is the chief of the Laboratory of Sensorimotor Research at the National Eye Institute. For the past 25 years he has been studying vision and oculomotor control in rhesus monkeys. He has studied saccadic eye movements, visual motion processing in the middle temporal area and medial superior temporal area of the cortex.

PUBLIC AFFAIRS
(continued from p. 69)

ILAR To Develop Report On Well-Being Of Nonhuman Primates

The Institute of Laboratory Animal Resources (ILAR) has been asked by the National Institutes of Health and the US Department of Agriculture to develop a report on the psychological well-being of nonhuman primates.

ILAR is a component of the National Research Council, National Academy of Sciences.

The report will have recommendations for institutions required to develop, document, and follow an appropriate plan for environment enhancement adequate to promote the psychological well-being of nonhuman primates.

A National Academy of Sciences committee, which will write the report, has been charged to review current understanding of the cognitive abilities of nonhuman primates; to identify and evaluate the environmental variables believed to be most influencial in affecting the well-being and the behavioral and physiological measures believed to be objective indices of well-being; to suggest priorities for future research; to develop a relevant bibliography on psychological well-being; and to develop recommendations and procedures for individualizing institutional plans consistent with federal law.

The task originates from a 1985 amendment to the Animal Welfare Act that requires institutions to provide a physical environment suitable to ensure the psychological well-being of nonhuman primates.

W. M. Samuels

People and Places notices come almost exclusively from information provided by members and interested institutions. To ensure timely publication, announcements must be received at least *three months* (by the 5th of the month) before the desired publication date. Send all information to Martin Frank, Editor, *The Physiologist*, APS, 9650 Rockville Pike, Bethesda, MD 20814.

Biological Psychology

Eugene H. Galluscio
Riverside, NJ: Macmillan, 1990, 708 pp., illus., index, $49.00

This book is intended to serve as the primary text for college level courses concerned with "the biological mechanisms underlying human behavior." It should be examined by anyone responsible for selecting a text for such a course. Given its size, scope, organization, clarity, and format, together with its physical appearance, I judge that it would be easy to teach and learn from this book. Dr. Galluscio proposes two particular objectives by which he intends to distinguish this text: to present biological psychology in an evolutionary perspective and to introduce the "excitement, wonder, and joy" experienced in the study of this subject. My personal disappointment with the final product arises far more from the expectations that these aspirations generate than from a comparison of the book with any competing text presently on the market.

The evolutionary perspective that is purported to be the distinguishing characteristic is exemplified in the introduction, a description of the complex mating behavior of an empis fly and a discussion of how this behavior might have evolved. An understanding of the evolutionary history of this insect, it is claimed, renders the mating behavior less mysterious, and human behavior will become less mysterious when looked at in terms of vertebrate evolution.

But increased knowledge of the evolutionary history of a species, it seems to me, only raises new mysteries. Surely what is needed to resolve them are theories, in this case mainly the theory of natural selection. It is the failure to recognize the role of theory in scientific explanation that is the chief shortcoming of this text.

Biological psychology is presented as a body of fact, not as a network of theories. Of course, if not made explicit in any scientific description, theory is pervasively implicit. In the introduction, for example, and throughout the book, the implicit theory is accepted that the major principles underlying the nervous system of invertebrates are similar, and not merely analogous, to those of vertebrates. Since this theory is neither explicitly presented nor defended, the relevance of the many pages devoted to invertebrate psychology is moot.

The tendency throughout the book to emphasize fact (descriptions and definition) and to down-play explanation (hypothesis and theory) seems ill-suited to the goal of communicating the excitement and wonder inherent in the topic. An even greater deficiency in this respect is the failure to make clear that for many of the most interesting questions, no generally accepted theories now exist. I suspect that the majority of students using this text will complete their courses with a feeling that they now have the mastery of so many facts that they must somehow have a understanding of how the nervous system functions, or if they do not, that this indicates a failure to adequately comprehend the material presented. Only the better students will realize that the reason they cannot answer such basic questions as "what happens when I dream?", "how can I remember my high school graduation?", "how can what goes on in my brain cause my index finger to move?", or "how can the genes present in a single cell give raise to an organ as complicated as the brain?" is that no one knows the answers. Not only is no attempt is made in the book to present a general theory, mechanism, or explanation for such interesting properties of the brain as dreaming, episodic memory formation, motor control, or brain development, our woeful lack of scientific understanding of these matters is not acknowledged.

Given the obvious familiarity of the author with the neuroscientific literature, I was astonished to read the following as the only reference to amino acids as neurotransmitters: "Some of these substances, such as glutamic acid and aspartic acid, appear to be only excitatory: others such as gamma-aminobutyric acid are thought to be exclusively inhibitory. The evidence for most amino acid transmitters is still somewhat weak. However, there is good evidence to support GABA as a neurotransmitter." A student relying solely on this text would be unaware of the present consensus that glutamate and aspartate are the major, and possibly the only, excitatory neurotransmitters in the vertebrate brain. That essentially all cerebral cortical neurons are either glutamatertgic, pyramidal projecting neurons, or GABAergic local inhibitory neurons is not mentioned, and the general features of connectivity among excitatory neurons in the brain are not described.

It is likely that these very general features of the vertebrate CNS are neglected as a result of the emphasis on a particular evolutionary viewpoint that tends to exaggerate similarities between vertebrate and invertebrate nervous systems and to neglect their distinctive differences. This emphasis might have also contributed to the surprising neglect of another awesome aspect of the vertebrate CNS, its growth and self-organization during animal development. The question of how evolution could give rise to systems of such complexity is nowhere addressed in this text.

Joseph A. Gally
The Neurosciences Institute

La fatigue musculaire: aspects biochimiques et physiologiques (Muscle Fatigue: Biochemical and Physiological Aspects)

G. Atlan, L. Beliveau, and P. Bouissou
Paris: Masson, 1991, 254 pp., illus., index, $58.43

The book is a compilation of the proceedings from the second (1990) scientific meeting devoted to the physiological and biochemical aspects of muscle fatigue organized by the thematic group of the French Association des Physiologistes. Focus of the proceedings involved review of current knowledge and the posing of unanswered questions. The concept of fatigue as a protective mechanism that reduces muscular degradation to preserve future capability was developed as an important theme. Factors were covered that involved central perception and control, receptors, excitation-contraction coupling processes, energetics, substrate utilization, by-product accumulation, and abnormal conditions including disease states.

An opening presentation on perspectives in the study of normal and pathological muscle was presented by Edwards and Gibson that summarizes their view about muscle integrity protection: "several safety factors at various levels of command have evolved" and "biological adaptation and training serves to minimize the risk of catastrophe." They conclude with the interesting statement, "The cause of fatigue may be transitory and beyond our measurements, though fortunately not beyond our imagination."

Investigators from 11 countries participated, with most based in Europe, particularly in France. The various entries are either in English or in French, although all of the symposia articles are in

English. Participants from outside Europe included persons from the United States, Canada, and South Africa. Seventeen relatively brief reviews related to the symposia are included; the remainder of the book is devoted to the abstracts from the oral communication and poster sessions.

Highlights from the symposia are probably of most interest. McCully et al. concluded from their NMR studies that with endurance training, the effect of lowered pH and increased Pi on force development is lessened. They explain that these effects may partially account for the greater fatigue resistance that results from endurance training. Sahlin suggests that the role of acidosis is indirect, involving lessened ATP generating capacity. Fitts et al. indicate that a better understanding of the E-C coupling process is needed, along with how the ionic environment and intramembranes t-tubular charge impacts the fatigue process. Investigation of acid-base balance in relation to lactate metabolism led Bouissou et al. to conclude that alkalosis inconsistently enhances endurance (with perhaps a central link involving perception) even though muscle lactate concentration is increased. They consider acid-base balance as providing a communication link between cellular metabolism and systemic adaptation. Examination of oxygen transport suggested to Jammes et al. that hypoxemia stimulates nerve endings in muscle that control rate coding patterns to motor units as evidenced by changes in EMG power spectra. Aubier, in reviewing respiratory muscle fatigue, emphasizes that it is possible to establish a diagnosis of inspiratory muscle fatigue and to treat it. In a paper on skeletal muscle disorders, Lewis and Haller identified accumulation of ADP as the metabolic common denominator of fatigue, but how ADP accumulation impairs exercise performance is poorly understood.

Although the focus of the majority of the articles is skeletal muscle, two symposia papers dealt with the myocardium. Kapelko and Novikova found that in the PCr depleted myocardium diastolic stiffness rose with increases in resistances loading, indicating decreased compliance associated with energetic depletion, as well as decreased left ventricular filling, limiting cardiac output. Evidence was found by Manier and Roudaut suggesting a slight but reversible cardiac fatigue during strenuous exercise, i.e., reduced fractional shortening, an increase in left ventricular systolic dimension, and impaired contractility.

Human performance/fatigue studies are also presented. Coyle, in studies of exercise performance, concluded that blood glucose utilization is critical and that if blood glucose oxidation can be maintained through carbohydrate feeding, fatigue during strenuous exercise can be delayed 30–60 minutes but not prevented. With respect to lipid metabolism, a provocative study involving consumption for six weeks of 6 $g \cdot d^{-1}$ of n-3 polyunsaturated fish fatty acids revealed that the rheology of red cells may enhance performance as indicated by an increase in VO_2max, greater capillary blood desaturation and increased glycogenolysis. Fery and Balase found that exercise by the starved individual leads to an initial process they labeled "accelerated starvation" and a second phase tending to maintain ketogenesis below certain limits. In a review of the effects of dehydration on performance, Candas and Botherel identified tachycardia and hyperthermia with decreased performance and fatigue. They also made a plea for further investigation to establish optimal fluid/elec-trolyte/electrolyte/nutrient formulations and regimens to enhance performance and avoid fatigue.

Central control is covered to some extent. For example, Maton emphasized that changes in precentral cortical cell firing rate probably occurs during prolonged static contractions and lays a role in regulating motor unit activity during fatigue. Wurtman and Lewis summarized some evidence that plasma amino acid pattern and choline concentration affect the rates at which monoamine transmitters and acetylcholine are synthesized in and released from central and peripheral neurons and thereby affect performance. Chaouloff reviews the effects of exercise on the brain monoaminergic systems with emphasis on the role for the dopaminergic and serotonergic systems in the perception of fatigue during exercise—the substances respectively displaying an activitory and an inhibitory influence on central networks.

In summary, the coverage is broad and of interest largely to those working on matters related to fatigue. The fact that many of the abstracts are in French should not deter those who only read English—there is ample information in English for them. Coverage of central mechanisms could have been more complete, as could neural trafficking and networking. The symposia articles are well referenced and the respective authors have in general provided useful reviews.

E. R. Buskirk
Emeritus Professor of Applied Physiology

Neuromethods, Vol. 14: Neurophysiological Techniques: Basic Methods and Concepts

Alan A. Boulton, Glen B. Baker, and Case H. Vanderwolf
Clifton, NJ: Humana, 1990, 408 pp. illus., index, $79.50

Neuromethods, Vol. 15: Neurophysiological Techniques: Applications to Neural Systems

Alan A. Boulton, Glen B. Baker, and Case H. Vanderwolf
Clifton, NJ: Humana, 1990, 377 pp., illus., index, $79.50

In the age of rapid advances in technology to unravel the mysteries of the central nervous system, it is refreshing to find two books that offer a consolidative discourse on state-of-the-art neurophysiological methods. The editors of *Neuromethods* have solicited the expertise of 24 investigators to compile two texts. The first of these books (Vol. 14) includes six chapters that describe the basic procedures and rationales for using various techniques to study the activity of single neurons or single membrane channels. In the first chapter, S. T. Kitai and M. R. Park offer sound advice on the types of amplifiers best suited in intracellular recording, the fabrication of microelectrodes, and injection of tracers to identify trajectories of single neurons. They take the reader through a series of basic questions of properties of synaptic transmission that can easily be answered by applying standard procedures in an experiment. In the second article, W. F. Wunderlin and colleagues offer an in-depth account of methodology essential for recording from single ion channels in cell membranes and in planar lipid layers. The appendix includes a list of sources for interfacing hardware and software that may be beneficial to those interested in incorporating these techniques into their research programs. In the next article, S. W. Jones provides an excellent guide to the use of whole-cell patch clamp and other voltage-clamp techniques. He clearly explains how such procedures can be used to take the investigator an important step fur-

ther when used in conjunction with other electrophysiological techniques. Pros and cons of the various techniques are pointed out. In the fourth chapter, Dr. Hopp and collaborators spotlight the techniques involved in optical measurement of membrane potentials. They offer helpful advice on the selection of the type of signal (birefringence, absorption, or fluorescence) and dye that would maximize the signal-to-noise ratio of the membrane potential measurements. Considerable space is devoted to a description of photodetectors, light sources, and image-recording technology essential for successful application of optical measurements in neurophysiological experiments. The electrochemical theory as related to ion-selective electrodes is presented by W. G. Carlini and B. R. Ransom in the next chapter. The authors explain how to construct, calibrate, and use ion-selective electrodes to obtain accurate measurements of ion concentrations in neuronal preparations. In the final chapter, N. T. Maidment and colleagues describe the use of carbon-fiber electrodes to measure the release of monoamines and their metabolites in the central nervous system. The theory behind the operation of in vivo voltammetry and its practical application are clearly presented.

The second book (Vol. 15) includes five chapters devoted to the application of various recording techniques in neurophysiological studies. In the first chapter, D. R. Humphrey and E. M. Schmidt describe the use of extracellular recording techniques, with emphasis on studies of individual neurons in the mammalian central nervous system. They offer excellent advice on improving the stability of the recording, on pulling a glass micropipette to obtain an appropriately contoured tip, and on criteria to isolate the action potentials of a single neuron in a recording field. In the next article, J. A. Hoffer shares his experiences in recording from single neurons, whole nerve bundles, and muscles in conscious animals. Among the topics covered are how to make and implant chronic recording devices, how to minimize noise in the recordings of electrical signals, and the limitations of these techniques. The chapter by E. Halgrin explains evoked potential analysis in human subjects. In addition to describing the essential methodology used to extract the evoked activity of a group of neurons from an electroencephalogram, the author provides specific information on some of the most common categories of evoked potentials (auditory, visual, somatosensory, and cognitive). One of the chapters by L.-W. S. Leung offers the reader a lucid account of the theory, application, and interpretation of field potential recordings to study function within the central nervous system. In his next chapter, Dr. Leung gives basic information on data acquisition and analysis procedures that are often used in neurophysiological studies and are available through the use of a microcomputer. The listings of commercially available hardware and software could help investigators first setting up or enhancing their computer systems.

The inclusion of "real life" experiences of the authors is a major highlight of these volumes. All too often when we try to implement a new technology into our research program, we are forced to deal with many frustrating steps before getting the system to function properly. These two volumes provide wise advice from experts who have already had to deal with these same road blocks. By reading selected chapters in these books, one may be able to save considerable time in mastering new techniques.

Although no single chapter could ever include all the information one needs to know about the hows and whys of a particular methodology, these books are a good beginning. Each of the chapters include a extensive bibliography that can be used as a reference course for more specifics concerning these techniques.

Susan M. Barman
Michigan State University

Neural Monitoring: The Prevention of Intraoperative Injury

Steven K. Salzman (editor)
Clifton, NJ: Humana, 1990, $69.50.

This is a book about the electrical monitoring of neural integrity in anesthetized patients undergoing surgery that threatens a portion of the nervous system. The electrical monitoring runs the gamut from somatosensory evoked potentials (the meat of the book) to cortical electroencephalography to motor evoked potentials. The variety of topics and authors as well as the repetitive nature of the chapter introductions give this work the true flavor of a compendium of presentations from a symposium. However, there are some common themes throughout all of the chapters that make this more than a simple patchwork. These themes are 1) basic mechanisms of normal and abnormal somatosensory evoked potentials, 2) basic pharmacological and physiological steps to prevent spinal cord and neurological damage, 3) clinical application, and 4) clinical outcomes.

The contributors make use of understandable animal experiments to define the neural substrates and various pertubations that alter the monitored electrical activity through the spinal cord. More importantly this work gives insight into the pathophysiological processes that lead to intra- and postoperative spinal cord injury. The chapter showing the "normal variability" in somatosensory evoked potentials should be satisfying to the skeptic who wishes to determine the reliability of this form of monitoring.

The authors do not stop at basic mechanisms but realize that the full import of somatosensory evoked potential monitoring lies in the improvement of outcome for the patient undergoing spinal surgery or repair of blood vessels supplying neural structures. Outcome data from hundreds of human cases are presented, giving a unique insight into the sensitivity and specificity of the monitoring methods used. It is the reliance on both human and animal data that makes this presentation balanced and accurate, showing both the limitations and the potential of this still evolving area of intraoperative monitoring. I recommend it for the clinician as a summary of the state of this art. The basic scientist will also find it useful as a means of bridging the gap between experimental nerve injury and clinical applications.

John C. Keifer
Pennsylvania State University

Scientific Meetings and Congresses

43rd Annual Meeting of American Institute of Biological Sciences (AIBS), Honolulu, HI, August 9–13, 1992. *Information:* AIBS Meetings Department, 730 11th Street NW, Washington, DC 20001-4521. Tel: 202-628-1500 or 1-800-992-2427; Fax: 202-628-1509.

XXXIII Congress of the International Society of Psychoneuroendocrinology (ISPNE), Madison, WI, August 16–20, 1992. *Information:* Steven E. Shelton, Conference Coordinator, University of Wisconsin, B6/210 Clinical Science Center, 600 Highland Avenue, Madison, WI 53792. Tel: 608-263-6079; Fax: 608-265-2565.

46th Annual Symposium of the Society of General Physiologists, Woods Hole, MA, September 10–13, 1992. *Information:* Society of General Physiologists, PO Box 257, Woods Hole, MA 02543. Tel: 508-540-6719.

Postgraduate Course: Tracer Methodology in Metabolic Research, Lake Tahoe, CA, September 21–24, 1992. *Information:* Robert Wolfe, Course Director, Shriners Burns Institute, 815 Market Street, Galveston, TX 77550. Tel: 409-770-6605; Fax: 409-770-6825.

14th Annual Meeting of the IUPS Commission of Gravitational Physiology, Berlin, Germany, September 29–October 3, 1992. *Information:* Lorraine Tucker, APS, Room 4402, 9650 Rockville Pike, Bethesda, MD 20814-3991. Tel: 301-530-7165; Fax: 301-571-1814.

1992 Meeting of the American Society of Zoologists (with the American Microscopical Society, Animal Behavior Society, The Canadian Society of Zoologists, The Crustacean Society, and the International Association of Astacology, Vancouver, BC, Canada. *Information:* Mary Adams-Wiley, Executive Officer, AMZ, 104 Sirius Circle, Thousand Oaks, CA 91360. Tel: 805-492-3585; Fax: 805-492-0370.

International Conference of the World Federation of Sleep Research Societies, Maui, HI, March 13–17, 1993. *Information:* WFSRS Conference Coordinator, Judy Franzblau c/o Global Events, 710 North Trenton Drive, Beverly Hills, CA 90210. Tel: 310-247-8004; Fax: 310-247-8457.

2nd International Congress for Pathophysiology, Kyoto, Japan, November 20–25, 1994. *Information:* Toshiie Sakata, First Department of Internal Medicine, Ooita Medical University, 1-1 Idaigaoka Hazamacho, Ooita-gun, Ooita, 879-55, Japan. Tel: 81-975-49-4411; Fax: 81-975-49-4217.

BOOKS RECEIVED

Obesity. Per Bjorntorp, Bernard N. Brodoff, et al. Hagerstown, MD: J.B. Lippincott, 1992, 805 pp., illus., index, $69.50.

Drug-Induced Dysfunction in Psychiatry. Matcheri S. Keshavan and John S. Kennedy (Editors). Bristol, PA: Taylor & Francis Group, 1992, 339 pp., illus., index, $59.50.

Plasticity of Motoneuronal Connections—Peripheral and Central. A. Wernig (Editor). New York: Elsevier, 1991, 512 pp., illus., index, $220.00.

Placenta: Basic Research for Clinical Application. H. Soma (Editor). International Conference on Placenta, Tokyo, October 1990. New York: Karger, 1991, 214 pp., illus., index, $184.00.

Renal Physiology. Bruce M. Koeppen and Bruce A. Stanton. Baltimore, MD: Mosby Year Book, 1992, 194 pp., illus., index, $23.95.

Cardiovascular Physiology. Robert M. Berne and Matthew N. Levy. Baltimore, MD: Mosby Year Book, 1992, 298 pp., illus., index, $26.95.

Neuromethods 20: Intracellular Messengers. Alan A. Boulton, Glen B. Baker, and Colin W. Taylor (Editors). Clifton, NJ: Humana, 1992, 580 pp., illus., index, $99.50.

Thermoregulation: The Pathophysiological Basis of Clinical Disorders. Peter Lomax and Eduard Schonbaum (Editors). International Symposium on the Pharmacology of Thermoregulation, 1991. Basel, Switzerland: Karger, 1992, 197 pp., illus., index, $125.00.

Cellular and Molecular Biology of the Kidney. Hikaru Koide, Hitoshi Endou, Kiyoshi Kurokawa (Editors). *Contributions to Nephrology,* Vol. 95. G.M. Berlyne, and S. Giovannetti (Series Editors). Basel, Switzerland: Karger, 1992, 288 pp., illus., index, $197.75.

Conference to Honor Steven Horvath

The international conference "Humans Under Stress: Will They Survive?" is planned for June 21–24, 1992 at the University of California, Santa Barbara. It is a symposium within the annual meeting of the Pacific Division of the American Association for the Advancement of Science.

The symposium is planned as a tribute to APS member Steven M. Horvath, an internationally known physiologist who reached 80 years of age in September 1991. Horvath has performed considerable research on the adaptive capabilities of humans. He has been a professor at UCSB for many years and continues to conduct research.

For further information contact Pacific Division—AAAS, California Academy of Sciences, San Francisco, CA 94118.

International ISSLS Fellowship Available

The International Society for the Study of the Lumbar Spine is offering International Fellowships to appropriate individuals in underrepresented/underdeveloped areas to financially sponsor them to attend and actively participate in the Society's next meeting in Marseille, France, June 15–19, 1993.

Applicants should have a demonstrated interest in clinical spine or nonclinical spine-related research. Receive information from ISSLS, Sunnybrook Medical Centre, Room A 309, 2075 Bayview Avenue, Toronto, Canada, M4N 3M5.

Dautrebande Prize Awarded

The 1991 Triennial Prize of the Dautrebande Foundation has been awarded to J. E. Dumont, University of Brussels, for his pioneer work on molecular biology of normal and pathological thyroid.

The next prize will be awarded in 1994. For more information contact the President of the Foundation, Dr. Stalport, "Maison Batta", 3 Avenue Batta—B.4500 HUY—Belgium.

APS Sustaining Associate Members

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

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Education Officer
American Physiological Society

The American Physiological Society invites applications for the position of Education Officer of the Society. The APS seeks a creative, energetic, and resourceful person who will work closely with the officers and committees to strengthen the Society's education efforts. The Society is looking to expand its efforts beyond its traditional award and education programs into the development of pre-college and public education programs.

Responsibilities: The Education Officer is responsible for working with the membership to develop creative initiatives in physiology education, for assisting in the development of grant support for programs, and for providing liaison for the Society's student and minority programs. The Education Officer reports to the Executive Director.

Qualifications: The successful candidate must possess personal and professional qualities of leadership and vision; be an effective manager; have successful teaching and/or administrative experience in education-related programs; and a history of successful working relationships with scientists, teachers, students, and administrators.

Applications: Applications should include a complete resume, and names, addresses,and telephone numbers of three references. In addition, applicants should submit a statement detailing their view on the role of a scientific society in education-related activities. Applications should be sent to Martin Frank, Executive Director, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991.

Applications will be accepted through September 1, 1992. Expected appointment date is January 1, 1993.

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