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NIH: Gearing Up for the Twenty-first Century

Wendy Baldwin and Peggy McCardle
Office of Extramural Research, National Institutes of Health

We at NIH are looking forward to a strong 21st century. There are many scientific opportunities that promise to be important in the next century: genetic medicine, neuroscience and the brain, prevention (e.g., teens and smoking), environmental risks and exposures, and aging. There are significant health threats that have already been recognized but remain unconquered: AIDS, tuberculosis, hemorrhagic fever, and problems associated with aging. There have been some major advances in these areas, and we look forward to more advances both in understanding and combating specific diseases and in the basic scientific research that underlies disease-fighting efforts. In order for scientists throughout the nation to continue this important work, we at NIH must continue to do our best in efficient, effective, responsible science administration.

With that goal in mind, we have been making changes in the way we do business at NIH — in how we review research grant applications and in how we make awards and track their progress. Scientist administrators at NIH are trying to prepare for the next few years, as well as the next century, to keep pace with the changing face of science and with current and future budgetary changes and to meet the challenge of finding and supporting the best science. The process must facilitate, not impede, and must ensure the lowest reasonable administrative costs. NIH is large, with 83% of our budget (about \$10 billion) spent on funding extramural research; our budget must be carefully managed.

NIH is large and diverse. We see this diversity as both valuable and necessary. NIH has 24 institutes, centers, and divisions, with 21 awarding components. Out of this diversity come many ideas, many different ways of doing business, and the opportunity to try things in different ways. In our attempts to streamline and reduce administrative costs, we try out our ideas in small pilots and then scale these efforts up when that is appropriate.

Many of the changes we have made recently have been a result of reinvention at NIH. In 1994, the extramural program of NIH was designated a reinvention laboratory by Vice President Gore's National Performance Review as part of its effort to create a government that "works better and costs less." The NIH framework for reinvention delineates four major themes: to maximize scientific opportunities through optimal use of resources, to enhance NIH interactions with the scientific community, to clarify and streamline the decision-making process, and to focus our internal operations on outcomes and results. With these themes in mind, we have been planning additional reinvention projects. The NIH Office of Extramural Research publishes a reinvention status report that is available through the home page at <http://www.nih.gov> on the "Grants" page. This report is updated periodically, so it is a good source for current information. Below, we highlight some recent changes and planned initiatives of interest to the extramural scientific community.

Since more than 80% of the NIH budget goes out to research universities and institutions and since peer review provides major input into

This article is based on remarks delivered to the annual retreat of the Association of Chairmen of Departments of Physiology, December 1996.

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the decision-making process about projects that we support, NIH has focused some early reinvention efforts on peer review. One successful effort has been the "streamlining" of review. We have saved time and money, but that was not the motivation. We established a means of focusing the review to ensure that there was fuller discussion of the most competitive among the more than 40,000 research proposals reviewed each year. When reviewers determine that discussion would not further their assessment of a project — about half of the applications — the projects are not discussed, but the written critiques are provided. For those that are discussed, the comments of reviewers and a summary of the discussion are provided directly to applicants and program staff, and this greater candor has been appreciated by both groups. We have implemented procedures to mail out summary statements faster, which also has been an advantage to scientists and NIH staff. In improving our process, we have not only served science but have made strides in terms of our civic obligation. We saved in meeting costs, in reviewer time at meetings, and in the number of administrative steps required internally at NIH. Scientific Review Administrators (SRA) no longer must spend time producing synthesized summary statements. Now, they simply write up the summary of the discussion on those applications that are discussed at review meetings.

Two other areas where peer review is changing are the rating of grant applications (RGA) and the integration of neurosciences review. RGA began with an internal NIH committee report that has been read and commented on by NIH staff, the extramural community, and the Peer Review Oversight Group. The RGA committee made 10 recommendations, and several of these are under current consideration. Initially, we focused on the three recommendations that deal with review criteria. The review criteria traditionally used by NIH in scientific and technical merit

review have been made more explicit in the hope that their use in structuring both the reviewers' written critiques and the discussion of applications at the review meetings will result in clearer communication to program staff and investigators about the strengths and weaknesses of the applications. At present, no changes are being made in the scoring system, although some changes will be considered in the future.

It is clear that structuring the review criteria will help reviewers to focus on the most important aspects of applications. We hope this will move reviews away from overfocusing on

branches of the institutes and centers. The second precipitating event was the rejoining of the alcohol, drug abuse, and mental health institutes to NIH and the need to integrate the review of applications for these institutes with the DRG. It was decided that this was an opportune time to examine how science maps to scientific review groups. The internal working group on this effort is currently soliciting the comments and assistance of the extramural scientific community and intends to have newly formed scientific review groups in action by the fall of 1998. Additional scientific areas will undergo this reor-

Creative ideas, novel methodologies, and ground-breaking collaborative ventures are features we are clearly seeking.

technical issues, frequently of a minor nature. It is essential that reviewers speak to the impact that a piece of research could have and that we are always positioned to elicit the best work that scientists are prepared to do. Scientific progress requires all types of projects, but we must not lose sight of creative, innovative work, even if there are technical hurdles to cross. We are very concerned that scientists send us the best proposals, that reviewers be on the look out for creative or innovative work, and that we structure the review to ensure that we clearly acknowledge such work. Creative ideas, novel methodologies, and ground-breaking collaborative ventures are features we are clearly seeking.

The second area of peer review where change is in process is the integration of the review of neuroscience applications. This initiative was triggered by two events. One was the report on the structure and function of the Division of Research Grants (DRG) that called for a reexamination of which applications are reviewed in the DRG and which are reviewed in the review

organization process over the next few years as we continue our vigilance to keep pace with the dynamic nature of biomedical research.

This year, a new policy was implemented to limit the number of amendments for any given application to two, with a two-year time limit on submission of revised applications. Part of the rationale for this was the lower subsequent success rates after two amendments. It appears that investigators will have a greater possibility of success if they take a fresh look and submit a new application. These are research investigators' responsibilities. There is more to come at NIH in terms of our own responsibilities, such as finding ways to make better use of SRA time, strengthening their ties to science, keeping them informed by program staff in the institutes and centers, and helping them to better educate reviewers about NIH.

Another major area where we focused our efforts is education and information. Our initial awakening to the possibilities of the World Wide Web during last year's furlough has blossomed into home pages for all of the

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NIH institutes, centers and divisions that you can reach through the NIH home page (<http://www.nih.gov>) under "Institutes and Offices." There are policy changes that we have advertised on the Web, such as the policy limiting the number of amended applications, the new policy allowing all reviewers (including ad hoc reviewers, now categorized as temporary review group members) to vote and score with chartered members, the requirement that investigators contact institute, center, and division staff prior to submission for any application that will exceed \$500,000 in any single year, and any changes in submission/receipt dates. We also use the Web to solicit opinions and suggestions, such as our recent effort

database. Both NIH and the funded organization can use the database to track their inventions and patents. Edison has become a model electronic interface for presenting a "common face to government," as it is to be used not only by NIH but also by seven other Federal agencies. The next step will be a linking of these government agencies so that users can input basic information securely but have it shared with any of the agencies without having to enter it in duplicate. This will mean a significant savings in effort and paperwork. Having tested the technology so successfully, we are now moving ahead on ERA.

The logic of ERA is to have a "Commons" area that investigators will

and simplified the progress reports through SNAP, our Streamlined Non-competing Application Process. SNAP will allow investigators to check and update their project abstracts online and submit annual progress reports, as well as enabling their administrative offices to update assurances. SNAP incorporates institutional approval with local control for release of the information to NIH and excellent data security. The last step of ERA development will be the submission of the actual research plan of the grant application. This has been scheduled last because of the complexity of the logistics of electronic transfer of rich text and images. When ERA is completed, grantee institutions' administrative offices will be able to use the "Commons" to run status checks. This should decrease the number of calls they need to make about grants by about 80%.

In accomplishing these streamlining efforts, we did not just automate existing processes, but re-engineered the underlying processes first. We examined such issues as the number of types of grants for which investigators might apply (career awards, fellowships, and new investigator awards) and whether there were functional reasons to have so many different types. We also considered the timing of information submission (our just-in-time efforts), such as some budget information, other support, and human subjects certification. By having only those about to receive an award submit detailed budget information, we saved investigators and research offices at applicant institutions lots of work, and we saved thousands of reams of paper!

While we clearly see our responsibility as scientist administrators as encompassing not only finding and funding the best science and doing this as efficiently as we can, we also realize that we have an educational responsibility. Those we must educate include the American public. They need to understand how basic as well as applied scientific research contributes to their

NIH is the largest single supporter of biomedical research in the world, and yet we are not a household word in our own country!

with RGA on the "Grants" page of the NIH home page. We have established a central e-mail address for comments on new initiatives, dder@nih.gov. We have used this special mailbox extensively for nearly two years now and are continuing to do so. In addition, the current activity on reorganizing the review of neuroscience applications has a specific e-mail address (neuro@drppo.drgh.nih.gov), and the working group is soliciting comments on that activity.

Our largest reinvention effort is the Electronic Research Administration (ERA), which encompasses a client server and new relational databases of NIH grants information with protection of confidential information. Edison, the first part of the ERA to be operational, deals with invention reporting. It can be found at <http://era.info.nih.gov/Edison/>, which is a secure Web site that permits grantees and contractors to submit confidential information about inventions and patents derived from federally funded projects to a secure shared

be able to access for information about funded research at NIH and current NIH policies, to which they can privately submit information required by NIH about their own funded research and to which they will eventually be able to submit applications electronically. In addition, NIH staff will be able to enter information that investigators can then access as they need it. Examples of this information exchange include institutional information that is now required on every grant application but in the future will be sent once and then electronically associated with each application submitted from that institution; summary statements of the results of scientific merit review (with access limited only to those with the appropriate passwords, i.e., principal investigators and NIH program officials); and progress reports on noncompeting continuations of awarded grants. Most of our work to date has been with the non-competing projects. We have trimmed the requirements for financial reporting

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health and the quality of their daily lives. It has become evident in the last two years that we do not have good name recognition. NIH is the largest single supporter of biomedical research in the world, and yet we are not a household word in our own country! Research!America found that in various states between 40-60% of those asked knew that the Food and Drug Administration approves drugs and that NASA funds space exploration, but virtually none (as low as 1-4%) knew that NIH funds biomedical research.

What can we do about this lack of name recognition? You as scientists can acknowledge NIH, not just as the supporter of your current grant but in a more general way. Tell the "NIH story." Research is highly competitive, and each project is subjected to rigorous peer review, with only the most meritorious funded. The process takes time.

Performing the scientific research itself also takes time and lots of effort. It is not a straight line from idea to discovery or then to applications to public health, and scientists undergo long periods of training in preparation for their careers in research. There are compelling stories of discovery that the public can understand and relate to, and we need to be telling these stories — all of us, scientists as well as scientist administrators. So there is a role that you all need to play as science research advocates.

In summary, we are excited about the next century of scientific research and about the scientific opportunities that the next century holds. We are gearing up for it by streamlining our operation while keeping it strong, responsive, and responsible. We are carefully exploring and adopting modern technologies that will make it possible to continuously improve our processes.

However, we do not do this only for research scientists; we must make these efforts in partnership with research scientists. All of us must include those who give us the funds that support scientific research — the American public. They have a right to understand how their tax dollars contribute to research and how that research contributes to the nation's health and the nation's future. Americans are receptive to information, as evidenced by the enthusiasm with which the Internet and World Wide Web are being incorporated into daily business and social life. We can use this technology as well as our own skills at communicating about what we love, science, to our supporters! But we can do this best in partnership. We at NIH look forward to strengthening our partnership with the extramural scientific community as we enter the new century. ♦

NIH News

Documents of Interest Available on the World Wide Web

Below is a sampling of information available on the NIH Home Page (<http://www.nih.gov>) or related links to whet your appetite and encourage you to explore all the information that is out there.

Office of Extramural Research NIH Home Page/Grants & Contracts

- New NIH Policy on Submission of Revised (Amended) Applications
- NIH Reinvention Activities: Status Report
- Peer Review Oversight Group Agenda
- Rating of Grant Applications (RGA)/Overview with ...
Link to download the full report
Update on RGA

Office of Extramural Research NIH Home Page/Funding Opportunities

- *The NIH Guide for Grants and Contracts*
- Compendium of Extramural Programs
- Program Guidelines
- Standard Form Application Instructions and Forms
- Peer Review Notes

Division of Research Grants (DRG) Home Page

- Advisory Committee Agendas and Minutes
- Study Section Meetings
- General Information on Changes in Receipt Dates and Links to Policy Information

There are also links from the NIH Home Page to the home pages of each of the institutes, centers, and divisions of NIH.

For general questions about extramural programs and grant application procedures, call ASK NIH at 301-435-7014 and follow the prompts or e-mail your questions to ASKNIH@ODROCKM1.OD.NIH.GOV. Responses to policy statements or documents open for comment can be sent to DDER@NIH.GOV. ♦

1997 Research Career Enhancement Awards

The Research Career Enhancement Awards are designed to enhance the research careers of APS members in good standing, strengthening their research programs and making them more competitive scientists. The awards are given competitively twice a year. Deadlines for applications are February 15 and August 15. In 1997, the spring round of applications resulted in the following 6 of 14 applications being accepted.

Klaus Bielefeldt, University of Iowa, will visit the laboratory of Hector Valdivia, University of Wisconsin, Madison, to learn techniques needed to perform experiments with isolated calcium release channels reconstituted into artificial bilayers. This technique will enable him to obtain information about the regulation and modulation of intracellular calcium release channels.

Susan Bloomfield, Texas A&M University, will take a course in reverse transcriptase polymerase chain reaction protocols, enabling her to complete studies of gene expression of insulin-like

growth factors following loading or disuse of rat tibia. Bloomfield will also visit the laboratory of Russell Turner, Mayo Clinic, to gain further knowledge of altered gene expression in response to mechanical loading or unloading in bone.

Carol Ann Courneya, University of British Columbia, will attend a laboratory course in molecular biology hosted by the Biotechnology Laboratory at the University of British Columbia. Her current studies on reflex mechanisms involved with blood pressure and blood volume regulation will be extended to the molecular level.

Ronaldo P. Ferraris, University of Medicine and Dentistry - New Jersey, will attend two workshops provided by the Life Technologies Training Center on recombinant DNA techniques and PCR techniques. He will then apply molecular and cloning technologies to his studies of developmental regulation of rat intestinal nutrient transporters, the effects of age and caloric restriction on intestinal nutrient transport, and the regulation of intestinal phosphate transport in fish.

Stephen A. Kempson, Indiana University, will visit the laboratory of Thomas P. Dousa, Mayo Clinic, to learn the bioassay of cyclic ADP-ribose using sea urchin egg homogenate, a procedure that is the basis for determining cyclase and glycohydase enzyme activity. He will study the mechanism by which glucocorticoids stimulate gluconeogenesis in primary cultures of rat renal proximal tubule cells and in isolated hepatocytes, enabling him to examine the role of the novel cyclic ADP-ribose signaling pathway in regulating the renal Na/Pi cotransporter.

G. Paul Matherne, University of Virginia, will attend two courses to learn new techniques in basic protein biology, Western blotting and immunodetection, and then quantitative RNA methodology. Matherne will also visit the laboratory of Jonas Galper, Brigham and Women's Hospital, Boston, to study G protein regulation in heart samples from his transgenic animals. ♦

Call for Nominations: The 1999 Walter B. Cannon Memorial Lecture

The Cannon Memorial Lecture honors Walter B. Cannon, President of the Society from 1913-1916 and one of the century's most distinguished physiologists. The plenary lecture is presented annually by a distinguished physiological scientist, domestic or foreign, at the spring meeting on a subject that addresses some aspect of the concept of homeostasis as enunciated in Cannon's classic work, *The Wisdom of the Body*. The lecture, sponsored by the Grass Foundation, is selected by the APS President-elect with the consent of Council.

The recipient receives an honorarium of \$4,000 plus travel and per diem expenses and is invited to submit a manuscript for consideration of publication in one of the Society's journals.

Nominations for the Cannon Lecture Award should be documented to demonstrate the candidate's contributions to physiology. A curriculum vitae should accompany the letter of support describing the nominee's achievements. Submit nominations by **October 1** to: The APS Cannon Lecture Award, 9650 Rockville Pike, Bethesda, MD 20814-3991. ♦

Call for Nominations: The 1999 Henry Pickering Bowditch Lecture

The annual Bowditch Lecture honors the first President of the American Physiological Society, Henry Pickering Bowditch.

The Lecturer is selected by the President with the consent of Council from among the regular members who have achieved outstanding work and are under 40 years of age at the time of presentation. The award is for original and outstanding accomplishments in the field of physiology. The award conveys an honorarium of \$2,500 plus travel and per diem expenses to attend the spring meeting, and the recipient is invited to submit a manuscript for publication in one of the Society's journals.

Nominations should be accompanied by letters from two nominators describing the importance of the candidate's work, a brief sketch of the nominee's professional history, papers or manuscripts that substantiate the excellence of the candidate, and a curriculum vitae.

Nominations should be submitted by **October 1** to: The APS Bowditch Lecture Award, 9650 Rockville Pike, Bethesda, MD 20814-3991. ♦

1997 Officers and Standing Committees

APS Council

Officers

Allen W. Cowley, Jr., President (1998)
L. Gabriel Navar, President-Elect (1998)
James A. Schafer, Past President (1998)

Councillors

Dale J. Benos (2000)
Walter F. Boron (1998)
Gerald F. DiBona (1998)
Celia D. Sladek (1999)
Richard J. Traystman (2000)
John A. Williams (1999)

ex officio members

Francis L. Belloni, Education (1997)
Edward H. Blaine, Finance (1998)
Ethan R. Nadel, Program (1997)
Leonard R. Johnson, Publications (1998)
John E. Hall, Section Advisory (1999)

Society Standing Committees

Animal Care and Experimentation

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

C. Terrance Hawk, Chair (1997)
Ronald J. Korthuis (1998)
Lorenz O. Lutherer (1999)
Ingrid H. Sarelius (1998)
John N. Stallone (1999)
Jackie D. Wood (1997)
Jennifer Laiprasert, student member (1999)
Andrea A. Seymour, *ex officio* (1998)
Eric O. Feigl, *ex officio* (1997)

Awards Committee

Oversees the award programs of the Society to ensure uniformity and conformity with the goals of APS, investigates new means of funding for the APS awards program, and selects Research Career Enhancement Awardees and APS Postdoctoral Fellowship Awardee.

D. Neil Granger, Chair (1997)
Thomas H. Adair (1999)
Hannah V. Carey (1999)
Martha E. O'Donnell (1998)
Roger G. O'Neil (1999)
Thomas V. Peterson (2000)
James B. Wade (1998)
Eleanor Ison-Franklin, *ex officio* (1999)
Kim E. Barrett, *ex officio* (1999)

Career Opportunities in Physiology

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

Steven L. Bealer, Chair (1997)
Nicholas S. Gantenberg (1999)
Andrew S. Greene (1998)
Polly A. Hofmann (1997)
Lori L. Woods (1998)
Jo Rae Wright (1999)
Edward J. Zambraski (1997)

Committee on Committees

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

Gerald F. DiBona, Chair (1998)
Celia D. Sladek (1999)
William J. Arendshorst (1999)
Beverly P. Bishop (1999)
Peter M. Cala (1998)
Suzanne M. Fortney (1997)
Joey P. Granger (1998)
Pamela J. Gunter-Smith (1997)
David R. Harder (1997)
Jeffrey R. Hazel (1997)
James M. Norton (1998)
Mary F. Ruh (1999)
Erik R. Swenson (1998)
William T. Talman (1999)

Ray G. Daggs Award

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

William F. Ganong, Chair (1997)
Elsworth R. Buskirk (1998)
Ronald H. Freeman (1999)

Education

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

Francis L. Belloni, Chair (1997)
Virginia L. Brooks (1998)
Herbert S. Chase (1997)
William M. Chilian (1999)
Linda S. Costanzo (1999)
Stephen E. DiCarlo (1997)
John R. Dietz (1999)
Barbara E. Goodman (1998)
James C. Schadt (1999)
Mary Anne Rokitka, *ex officio* (1999)
Penny Hansen, *ex officio* (1998)
Steven L. Bealer, *ex officio* (1997)

Finance

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

Edward H. Blaine, Chair (1998)
Mordecai P. Blaustein (1998)
Jack L. Feldman (1998)
Harvey V. Sparks, Jr. (1997)
James A. Schafer (1998)
Allen W. Cowley, Jr., *ex officio* (1998)
L. Gabriel Navar, *ex officio* (1998)
Leonard R. Johnson, *ex officio* (1998)

Honorary Membership

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

Stanley G. Schultz, Chair (1997)
Vernon S. Bishop (1999)
William H. Dantzer (1998)

International Physiology

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

Ernst Knobil, Chair (1998)
Walter N. Duran (1999)
John E. Greenleaf (1999)
Hector Rasgado-Flores (1998)
Ian A. Reid (1997)
J. Carlos Romero (1999)
Aubrey E. Taylor, *ex officio* (1997)
Harvey V. Sparks, Jr., *ex officio* (1997)

Liaison With Industry

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

Andrea A. Seymour, Chair (1998)
James E. Foley (1997)
Melvyn Lieberman (1997)
Terry J. Opgenorth (1997)
David M. Pollock (1999)
Francis G. Spinale (1999)
Steven L. Bealer, *ex officio* (1997)
Francis L. Belloni, *ex officio* (1997)
Ethan R. Nadel, *ex officio* (1997)

Long-Range Planning

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

Brian R. Duling, Chair (1999)
John S. Cook (1997)
Helen J. Cooke (1999)
Robert D. Foreman (1999)
Hershel Raff (1998)
Andrea J. Yool (1998)
David B. Young (1997)
Richard J. Traystman, Councillor (2000)

Membership

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

Sue Amy Shapses, Chair (1998)
Kirk W. Barron (1998)
Pamela K. Carmines (1999)
Ali A. Khraibi (1999)
Russell C. Scaduto, Jr. (1997)
Jeanne L. Seagard (1999)
Lou Ann Stephenson (1998)

Perkins Memorial Fellowship

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

Aubrey E. Taylor, Chair (1997)
Donald G. Davies (1997)
Aviad Haramati (1998)
George D. Leikauf (1998)
Molly P. Hauck, *ex officio* (indefinite)

Porter Physiology Development

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

Eleanor L. Ison-Franklin, CoChair (1999)
H. Maurice Goodman, CoChair (1998)
Reinier Beeuwkes (1997)
Martha L. Blair (1999)
Margaret Colden-Stanfield (1998)
Irving G. Joshua (1999)
J. Michael Overton (1997)
Phillip L. Rayford (1998)
R. Clinton Webb (1997)

Program

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

Ethan R. Nadel, Chair (1997)
Thomas E. Lohmeier (1998)
Richard L. Moss (1997)
Judith A. Neubauer (1998)
D. Eugene Rannels (1997)
Richard J. Roman (1999)
L. Gabriel Navar, *ex officio* (1998)

Program Advisory

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

Chair—Ethan R. Nadel (1997)
Cardiovascular—Gary K. Owens (1997) & Kathryn Lamping (1998)
Cell and General Physiology—Dale J. Benos (1999)
Central Nervous System—Susan M. Barman (1999)
Comparative Physiology—Michael A. Castellini (1997)
Endocrinology and Metabolism—Susan K. Fried (1999)
Environmental and Exercise Physiology—Ronald L. Terjung (1999)
Gastrointestinal Physiology—Patrick Tso (1997)
Neural Control and Autonomic Regulation—Michael C. Andresen (1997)
Renal—Jeff M. Sands (1997) and Jurgen B. Schnermann (1999)
Respiration—Ivan F. McMurtry (1999)
Teaching of Physiology—Nels C. Anderson (1997)
Water and Electrolyte Homeostasis—Joseph R. Haywood (1999)
Epithelial Transport Group—John Cuppoletti (1998)
History of Physiology Group—Charles M. Tipton (1999)
Hypoxia Group—Nanduri R. Prabhakar (1999)
Myobio Group—Thomas M. Nosek (1999)
Members in Industry Group—Andrea A. Seymour (1998)
Education Committee—Francis L. Belloni (1997) & Penny Hansen (1998)

Public Affairs

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

Eric O. Feigl, Chair (1997)
David D. Gutterman (1998)
Florence N. Hutchison (1997)
Ralph Lydic (1999)
David W. Ploth (1999)
R. John Solaro (1998)
Terry N. Thrasher (1997)
C. Terrance Hawk, *ex officio* (1997)
Andrea A. Seymour, *ex officio* (1998)

Publications

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

Leonard R. Johnson, Chair (1998)
Jerome A. Dempsey (1997)
Donald S. Faber (1998)
Virginia M. Miller (1998)
Stephen H. Wright (1999)
Allen W. Cowley, Jr., *ex officio* (1998)

Section Advisory

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

Chair—John E. Hall (1999)
Cardiovascular—Allyn L. Mark (1997)
Cell and General Physiology—Paul J. De Weer (1998)
Central Nervous System—Bruce G. Lindsey (1999)
Comparative Physiology—David H. Evans (2000)
Endocrinology and Metabolism—Marian R. Walters (1998)
Environmental and Exercise Physiology—Charles M. Tipton (2000)
Gastrointestinal Physiology—Hannah V. Carey (2000)
Neural Control and Autonomic Regulation—Eileen M. Hasser (1999)
Renal Physiology—Mark A. Knepper (1999)
Respiration—Thomas R. Martin (1999)
Teaching of Physiology—Robert G. Carroll (1999)
Water and Electrolyte Homeostasis—Ronald H. Freeman (2000)

Senior Physiologists

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

Robert M. Berne, Chair (1998)
Stephen M. Cain (1999)
Richard L. Malvin (1997)
Eugene M. Renkin (1998)
William J. Stekiel (1998)
Arthur J. Vander (1999)
Harold S. Weiss (1997)

Women in Physiology

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

Kim E. Barrett, Chair (1999)
Susan M. Barman (1999)
Ann Bonham (1999)
Ulla C. Kopp (1999)
Jane F. Reckelhoff (1998)
Mary I. Townsley (1998)
Alice R. Villalobos (1999)
Erin L. Seifert, student member (1999)

Society Representatives to Other Organizations

American Association for Accreditation of Laboratory Animal Care
C. Terrance Hawk (1997)

American Association for the Advancement of Science

Lynne E. Olson (1998)
Frank L. Powell (1998)

Council of Academic Societies of the Association of American Medical Colleges

Vernon S. Bishop (1998)
William H. Dantzler (1997)

FASEB Board

James A. Schafer (1999)
L. Gabriel Navar (2001)

Executive Officers Advisory Committee

Martin Frank (indefinite)

Finance Committee

Franklyn G. Knox (1998)

Excellence in Science Award

Kim E. Barrett (1999)

Life Sciences Advisory Committee

Margaret C. Neville (1997)

Public Affairs Executive Committee

James A. Schafer (1999)

Public Affairs Advisory Committee

Eric O. Feigl (1997)

Publications & Communications Committee

Catherine S. Chew (1997)

Research Conference Advisory Committee

L. Gabriel Navar (1999)

Wellcome Visiting Professorship

Robert Gore (1999)

National Association for Biomedical Research

Martin Frank (indefinite)

US National Committee for IUPS

James A. Schafer (1998)
Allen W. Cowley, Jr. (1999)
L. Gabriel Navar (2000)

US National Committee on Biomechanics

David Brown (1999)

Membership Statistics

Total Membership 7,858

Distribution by Employment
(7,286 respondents)

	No.	%
Physiology depts.	2,374	32.6
Other preclinical depts.	580	8.0
Clinical	1,681	23.1
Administration	47	0.6
Hospitals and clinics	299	4.1
Veterinary schools	151	2.1
Dental schools	39	0.5
Public health and grad. schools	126	1.7
College or university	1,116	15.3
Commercial companies	201	2.8
Government	375	5.1
Institutes and foundations	204	2.8
Private practice	36	0.5
Other, emeritus or inactive	57	0.8

Distribution by Racial Background and Heritage (optional personal data)

	Total respondents
American Indian or Alaskan	17
Asian or Pacific Islander	671
Black	78
White	5,509
Hispanic	137

Distribution by Earned Degree

(6,798 respondents — includes 1,158 individuals with multiple doctorate degrees)

PhD	4,743
MD	2,753
DVM	186
ScD	105
DDS	36
EDD	26
Cand. Med.	29

Distribution by Sex (optional personal data)

	Total respondents
Female	1,078
Male	5,879

Distribution by Age (optional personal data)

	Total respondents
70+	970
60-69	1,104
50-59	1,793
40-49	2,199
30-39	1,132
20-29	379

Principal Type of Work

(7,357 respondents)

	%
Research	75.8
Teaching	11.4
Clinical	6.9
Administration	5.3
Other	0.6

Distribution Primary by Section Affiliation
(6,406 respondents)

	%
Cardiovascular	24.2
Respiration	12.9
Cell & General	11.0
Endocrinology and Metabolism	10.1
Environmental and Exercise	7.8
Renal	7.5
Central Nervous System	7.4
Gastrointestinal	5.6
Comparative	4.3
Neural Control and Autonomic Regu.	4.0
Teaching of Physiology	2.6
Water and Electrolyte Homeostasis	2.4

Distribution by Group Affiliation

	%
MyoBio-Muscle Group	17.1
Epithelial Transport Group	15.2
History of Physiology Group	8.5
Hypoxia Group	8.2
Members in Industry Group	4.3

Distribution by Primary Specialty

(7,220 respondents)

	%
Anesthesia	0.6
Anatomy and embryology	0.2
Biochemistry	0.8
Biophysics	0.7
Biomedical engineering	0.5
Blood	1.6
Cardiovascular	24.0
Cellular and tissue	3.9
Comparative physiology	2.6
Electrolytes and water balance	5.2
Endocrines	6.6
Energy metabolism and temperature	2.5
Environment	2.5
Gastrointestinal	5.0
General physiology	0.7
Gerontology	0.3
Immunology	0.3
Liver and bile	0.4
Lipids and steroids	0.7
Minerals, bone, and teeth	0.6
Muscle and exercise	7.1
Neurosciences	11.0
Nutrition and food	1.0
Pharmacology	1.6
Radiology	0.3
Renal	6.0
Reproduction	1.4
Respiration	11.0
Other	0.6

APS Membership in the Americas

US	7,157
Canada	389
Brazil	24
Mexico	14
Argentina	8
Chile	6
Peru	4
Venezuela	4
Grenada	3
Jamaica	3
British West Indies	2
Costa Rica	1
Panama	1

US States With More Than 100 Members

(50 states plus District of Columbia, Puerto Rico, Guam, and the Virgin Islands)

California	781
New York	601
Texas	494
Pennsylvania	406
Maryland	361
Illinois	331
Massachusetts	330
Ohio	279
Michigan	240
North Carolina	194
Florida	190
New Jersey	182
Missouri	180
Virginia	152
Connecticut	146
Wisconsin	146
Georgia	138
Tennessee	134
Louisiana	132
Indiana	130
Minnesota	126
Washington	118
Alabama	109
Iowa	107
Colorado	106
Arizona	103

APS Membership Outside the Americas

(countries with five or more members)

Japan	150
Germany	87
United Kingdom	72
France	59
South Korea	54
Australia	47
Italy	39
Denmark	37
Switzerland	37
Netherlands	30
Spain	25
Belgium	24
Sweden	23

Membership

Election of New Regular Members (79)

* Upgrade from Student

Leonard P. Adam
Boston Biomedical Research Institute

Karen L. Ball
Alma College

Ali Banan
St. Louis University Medical Center

*** David G. Bernard**
University of Texas at Arlington

Timothy D. Bigby
University of California at San Diego

William E. Brownell
Baylor College of Medicine

Lucio Ronaldo Cardoso
University of Rio de Janeiro, Brazil

*** Joan F. Carroll**
University of Mississippi

David A. Chappell
University of Iowa

Andrew Chiu
NPS Pharmaceuticals

*** Daniel J. Conklin**
University of Texas Medical Branch

Claire T. Farley
University of California at Berkeley

John R. Feiner
University of California at San Francisco

Yuman Fong
Cornell University Medical College

Robert Fried
Hunter College, City Univ. of New York

Susan C. Frost
University of Florida

Arlyn Garcia-Perez
NIH

*** Matthew James Gdovin**
University of Calgary, Canada

Ricardo Jorge Gelpi
University of Buenos Aires, Argentina

Timothy A. Gilbertson
Pennington Biomedical Research Center

Christopher M. Gillen
Yale University

Robert L. Goodman
West Virginia Univ. Health Sciences Center

Dick Greene
New Mexico Highlands University

Kenneth W. Gross
Roswell Park Cancer Institute

Lawrence M. Grover
Marshall University School of Medicine

*** Yi Guo**
University of Alabama at Birmingham

Lori A. Gustafson
University of Washington

Tara Little Haas
Yale University

Deborah L. Hasten
Washington University School of Medicine

Daniel H. Hechtman
Children's Hospital of Pittsburgh

*** Charles Christopher Horn**
Center for Neurobiology and Behavior

John H. Johnson
Parke-Davis Pharmaceutical Research

Stephen Mark Johnson
University of Wisconsin

Rosemary Cristian Jones
Harvard Medical School

Gregory J. Kaczorowski
Merck and Company

Martin F. Kagnoff
University of California at San Diego

Daniel Kapusta
Louisiana State University

Evan Raymond Kokoska
St. Louis University Medical School

David Thomas Kurjiaka
University of Arizona

Marc S. Levin
Washington University School of Medicine

Jonathan Lytton
University of Calgary, Canada

Xin-liang Ma
Thomas Jefferson University

Antonio Martin
Boston University

Sandra L. Martin
University of Colorado

(continued on page 100)

Membership Statistics

Taiwan	21	Serbia, Thailand, Turkey, Ukraine, United Arab Emirates.
Israel	20	
Norway	15	
Hong Kong	13	
Austria	12	
New Zealand	10	
India	8	
Greece	7	
Hungary	7	
Poland	5	
Republic of South Africa	5	
<i>Other Countries Represented:</i> Belarus, Cameroon, Czech Republic, Finland, Iceland, Indonesia, Ireland, Luxembourg, Philippines, Portugal, Russia, SW Africa, Saudi Arabia,		
Canadian Provinces With Five or More Members		
Ontario	154	
Quebec	87	
British Columbia	47	
Alberta	41	
Manitoba	23	
Saskatchewan	13	
Nova Scotia	10	
<i>Other Provinces Represented:</i> New Brunswick and Newfoundland.		

Membership

(continued from page 99)

Kathryn E. Meier
Medical University of South Carolina

Mary P. Miles
Pennsylvania State University

Catherine F. Notarius
University of Toronto, Canada

Gordon Victor Ohning
University of California at Los Angeles

Yoshio Okada
University of New Mexico

Kitt Mia Falk Petersen
Yale University

Xu Ping
University of Utah

Jennifer S. Pollock
Medical College of Georgia

Charalobos Pothoulakis
Beth Israel Hospital

Michael D. Rokaw
University of Pittsburgh

Luciano Rossetti
Albert Einstein College of Medicine

Hubert K. Rucker
Meharry Medical College

Michael J. Sanderson
University of Massachusetts

Lisa Schwiebert
University of Alabama at Birmingham

Elmir Schic
University of Tennessee at Memphis

Charles N. Serhan
Brigham & Women's Hospital

Rae Silver
Barnard College

Eric J. Smart
University of Kentucky

Manis J. Smith
University of Mississippi Medical Center

Zoltan Spolarics
Univ. of Med. & Dentistry of New Jersey

Mark E. Steinhilper
University of Texas

Robert M. Strieter
University of Michigan

Michael P. Stryker
University of California at Berkeley

Masaaki Tamura
Vanderbilt University Medical School

M. Tarnopolsky
McMaster University, Canada

Jay H. Traverse
University of Minnesota

William Stanley Trimble
Hospital for Sick Children, Toronto

Hidekazu Tsukamoto
University of South Carolina

Jerrold R. Turner
Wayne State Univ. School of Medicine

Robert S. Turner
Emory University School of Medicine

Robert Volpe
Wellesley Hospital

Frans J. Walther
University of California at Los Angeles

Joanne Wright
University of British Columbia, Canada

Tianen Yang
Mt. Sinai Medical Center

Gong Zhao
New York Medical College

Election of New Corresponding Members (39)

Giuseppe Ambrosio
Univ. of Perugia School of Medicine, Italy

Romualdo Belardinelli
Lancisi Institute, Italy

Wei Fan
Oregon Health Sciences University

Yvan Fischer
Institute of Physiology, Aachen, Germany

Elke Golding
Baylor College of Medicine

Roger Green
University of Manchester, UK

Reinhard Haessler
Oregon Health Sciences University

Clive Edward Winston Hahn
University of Oxford, UK

Yoshio Hatano
Wakayama Medical College, Japan

Fumiaki Hayashi
Chiba Univ. School of Medicine, Japan

Markus Hecker
University of Goettingen, Germany

Andrew Henderson
Univ. of Wales College of Medicine, UK

Ju Lun Hong
University of Kentucky

Takashi Horiguchi
Akita Univ. School of Medicine, Japan

Ping-Chun Lucy Hou
Ntnl. Cheng Kung Univ., Republic of China

Ben J.A. Janssen
Universiteit Maastricht, Netherlands

Mikko Juusola
University of Cambridge, UK

Akimichi Kaneko
Keio University School of Medicine, Japan

Robert E. Kemm
University of Melbourne, Australia

M. Pilar Lostao
Universidad De Navarra, Spain

Ove Lundgren
Goteborg University, Sweden

Jean-Jacques Mercadier
Hopital Marie Lannelongue, France

Toyoaki Murohara
St. Elizabeth Medical Center, Japan

Etienne Olivier
University of Louvain, Belgium

Francoise Pecker
INSERM, France

Gabriele Pfitzer
Institut Fur Vegetative Physiol., Germany

F. Raul
INSERM, France

Tony Reybrouck
Gasthuisberg University Hospital, Belgium

Mitsuro Saito
Toyota Technological Institute, Japan

Abdullah Sakarcan
Louisiana State University

Piergiorgio Strata
University of Turin, Italy

Kenji Sunagawa
Ntnl. Cardiovascular Cent. Res. Inst., Japan

Tsuneo Takenaka
Saitama Medical College, Japan

B. Vallet
Centre Hospitalier Universitaire, France

Dahai Xue
University of Wisconsin

Shuh-tsung Yang
Ntnl. Defense Med. Cent., Republic of China

Xueqian Zhang
Milton S. Hershey Medical Center

Yumei Zong
University of California at Los Angeles

Membership

Election of New Student Members (64)

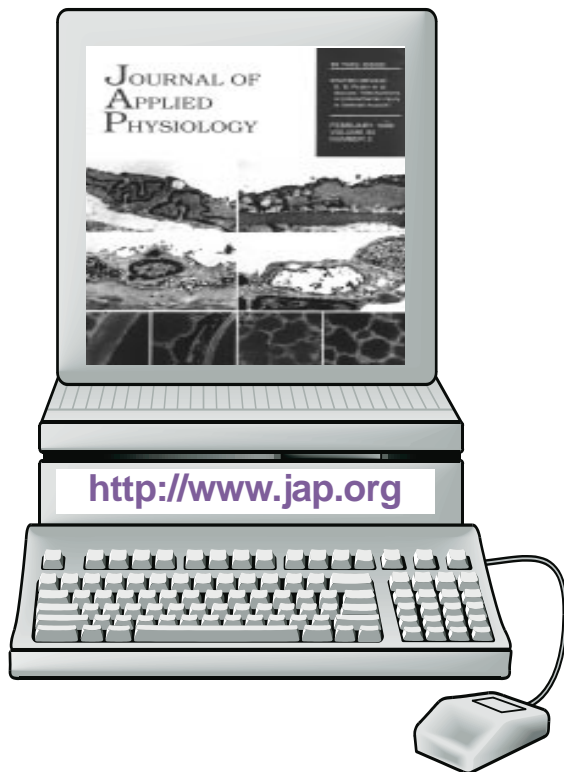
William Juan Calvo State University of New York at Buffalo	Matthew R. Jackman Arizona State University	Gregory T. Nelson University of Calgary, Canada
Vernon T. Cannon Georgia State University	Lan Jiang Univ. of Med. & Dentistry of New Jersey	William Noonan University of Cincinnati
Robert Carter, III Southern University, Texas	Douglas G. Johns University of Michigan	Janelle M. Novak Michigan State University
R. Michael Casto Florida State University	Joel Keith Jones Washington State University	L. Maureen Odland University of Guelph, Canada
Michael Champagne Louisiana State University	Andrea Leigh Kalda University of British Columbia, Canada	Sheri B. Parker Eastern Virginia Medical School
Margaret P. Chandler Northeastern Ohio Univ. Coll. of Medicine	Sooman Kim Michigan State University	Donny Dal Ponte University of Arizona
Zhaoming Chen Allegheny University	Casey A. Kindig Kansas State University	Zachary T. Resch University of North Dakota
Andrew Clark Medical College of Georgia	Patrick L. Klimczyk University of South Dakota	Liangyou Rui University of Michigan
Linda Ruble Davrath Colorado State University	Stacy L. Kovacs Michigan State University	Uzma S. Shah University of Pittsburgh
Christiana DelloRusso University of Michigan	Michael D. Lappi Ohio State University	J. Storm Shirley University of Northern Texas
Bryan Derrickson Duke University	James D. Leiber Univ. of Osteopathic Med. & Hlth. Sci.	Patrick C. Smith Pennsylvania State University
Bracken J. De Witt Indiana University	Christina Carol Lewis Colorado State University	Jennifer Sonner George Washington University
H. James Dixon Michigan State University	Mingyu Liang Mayo Clinic, Minnesota	Jackie J. Turner Univ. of Osteopathic Med. & Hlth. Sci.
Robin L. Erickson University of Michigan	King-Teh Lin Univ. of Med. & Dentistry of New Jersey	Derek C. Underhill East Tennessee State University
Aaron C. Gerlach University of Pittsburgh	Maureen Jane MacDonald University of Waterloo, Canada	Kurt Venator University of Texas at Austin
Martin F. Gerrits Arizona State University	Wanda Sue Marley Colorado State University	Gang Wang University of Iowa
Jason Grove Michigan State University	Gregory F. Martel University of Maryland	Jason Wilkes University of Guelph, Canada
Amy Halseth Vanderbilt University Medical School	Robin Leigh Martin University of Florida	Nicole L. Yarbrough Indiana University
Thomas James Hawke University of Guelph, Canada	Wenjun Z. Martini Univ. of Texas Med. Branch at Galveston	Kun Zhang University of Nebraska Medical Center
Bree Henderson Michigan State University	John W. McGillicuddy University of Michigan	Qi Zhao Ohio State University
Karen Hinkle University of Michigan	Matthew T. Moyer Penn State Univ., Hershey Medical College	Huailing Zhong Wayne State University
Jason Y. Hokama University of Arizona	Nicolette K. Muentert Univ. of Northern Texas Hlth. Science Ctr.	

Dues notices are in the mail!

If you have not received yours, please contact APS membership.

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e-mail: members@aps.faseb.org



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Meetings

Spanish-American Collaboration in Physiology

After three years of planning, the first International Joint Meeting of the Spanish Physiological Society (SECF) and APS took place in Benalmádena, Spain, from February 4 to 7, 1997. Benalmádena is an attractive village in the center of the Costa del Sol situated between the azure waters of the Mediterranean and the coastal mountains. The meeting took place at the Hotel Alay, adjacent to the architecturally distinct municipal marina. The joint meeting coincided with the 28th National Congress of SECF.

The Organizing Committee was chaired by **Salvatore González-Barón** and consisted of the faculty of physiology of the University of Málaga. The Committee created a stimulating program consisting of 11 symposia, 3 plenary lectures, 2 workshops, and oral and poster sessions comprised of 223 volunteered papers. The integration of physiological research from organ systems to the context of cell and molecular biology was highlighted. Nearly 350 scientists from more than 18 countries helped to make this a truly international meeting. Approximately 35 scientists from the US participated in the meeting.

The opening ceremony included comments from **D. Antonio Díez de los Ríos**, Rector of the University of Málaga; **Salvatore González-Barón**, Uni-



(l to r) Bernard Soria, Martin Frank, James Schafer, Jose Delgado García, and Salvatore González-Barón.

versity of Málaga; SECF President **Jose Delgado García**, University of Seville; APS President **James A. Schafer**, University of Alabama at Birmingham; and APS Executive Director **Martin Frank**. The comments were all fairly uniform, reflecting on past interactions between American and Spanish physiologists and suggesting that this first joint meeting of the societies could play an important role in stimulating more broadly based and closer scientific interactions between Spanish and American physiologists. Following the opening ceremony, a forum for expanded collaborative interactions was provided in the form of a informal reception with characteristic Spanish music and entertainment.

On Wednesday, February 5, the scientific sessions ended with a special Andalusian dinner hosted by the Mayor of Benalmádena. The informal dinner provided attendees with an opportunity to taste some of Costa del Sol's typical local dishes and enjoy the area's famous folklore. The evening of music and dance featured a number of American scientists who volunteered to participate in some of the local dances.

The organizers also arranged for an accompanying persons' tour of the town of Benalmádena. The trip included a visit to this typical southern village, to the museum of pre-Columbian South American ceramics, and to a show of performing eagles.

The final act of the joint meeting of APS and the SECF was the closing dinner. At the end of the meal, the leaders of both societies spoke of the role that this meeting had played in the development of collaborative interactions and scientific understandings between the participants. It was their hope that the attendees would nurture the interactions created by the joint meeting and allow them to flower and grow. In presenting certificates of appreciation to the organizers of the joint meeting, James Schafer expressed his hope that APS would be able to extend an invitation to SECF for a future joint meeting in the US. ♦



(l to r) Bernard Soria, Martin Frank, Antonio Díez de los Ríos, Jose Delgado García, Salvatore González-Barón, James Schafer, and Francisco Mora.



.....

The Physiology and Functional Diversity of Amiloride-Sensitive Na⁺ Channels: A New Gene Superfamily

October 29 - November 1, 1997 • Park City, UT

Experimental Biology '98

April 18-22, 1998 • San Francisco, CA

Endothelial Regulation of Vascular Tone: Molecular to Integrative Physiology

September 16-19, 1998 • Augusta, GA

The Paraventricular Nucleus of the Hypothalamus: A Crossroads of Integrative Physiology

December 5-9, 1998 • San Antonio, TX

.....

Please send me program and registration information for the following APS Conferences:

☐ ***The Physiology and Functional Diversity
of Amiloride-Sensitive Na⁺ Channels:
A New Gene Superfamily***

☐ ***Experimental Biology '98***

☐ ***Endothelial Regulation of Vascular Tone:
Molecular to Integrative Physiology***

☐ ***The Paraventricular Nucleus of the
Hypothalamus: A Crossroads of
Integrative Physiology***

Name _____

Department _____

Institution _____

Address _____

City/State _____

ZIP/Postal Code _____

Country _____

Phone _____

FAX _____

E-mail _____

Mail to: *The APS Conference Office, The American Physiological Society,
9650 Rockville Pike, Bethesda, Maryland 20814-3991, USA*

Or fax your request to 301-571-8313.

Meetings

1997 APS Conference

The Physiology and Functional Diversity of Amiloride-Sensitive Na⁺ Channels: A New Gene Superfamily

October 29–November 1, 1997 • Park City, UT
Olympia Park Hotel and Conference Center

ORGANIZERS:

Dale J. Benos

University of Alabama at Birmingham

Bernard C. Rossier

University of Lausanne, Switzerland

STEERING COMMITTEE:

Douglas C. Eaton

Emory University School of Medicine

Lawrence G. Palmer

Cornell University Medical College

Bruce Stanton

Dartmouth College Medical School

David G. Warnock

University of Alabama at Birmingham

Deadlines: Abstracts

June 13, 1997

Advance Registration

September 15, 1997

PROGRAM

WEDNESDAY, October 29, 1997

Welcome

Meeting Overview

Dale Benos, University of Alabama at Birmingham, and **Bernard Rossier**, University of Lausanne, Switzerland

Ion Channels: Evolution and History

Ramon Latorre, University of Chile at Santiago

The ENaC Family

William Guggino, Johns Hopkins University

Cecilia Canessa, Yale University; **Laurent Schild**, University of Lausanne, Switzerland; **Peter Snyder**, University of Iowa; **Bernard Rossier**, University of Lausanne, Switzerland; **Edith Hummler**, University of Lausanne, Switzerland; **Richard Lifton**, Yale University; **Catherine Fuller**, University of Alabama at Birmingham

THURSDAY, October 30, 1997

Na⁺ Channels in the Kidney

James A. Schafer, University of Alabama at Birmingham

Lawrence G. Palmer, Cornell University Medical College; **Brian Ling**, Emory University; **Nicolette Farman**, INSERM, Paris; **Bruce Stanton**, Dartmouth College Medical School; **Matt Breyer**, Vanderbilt University; **Steven Ernst**, University of Michigan

Regulation of Na⁺ Channels

Dennis Ausiello, Massachusetts General Hospital

Haim Garty, Weizmann Institute of Science, Israel; **Sarah Sariban-Sohraby**, University of Brussels, Belgium; **Nick Johnson**, Presbyterian University Hospital; **Horacio Cantiello**, Massachusetts General Hospital; **Iskander Ismailov**, University of Alabama at Birmingham

FRIDAY, October 31, 1997

Socratic Debate: How Does cAMP Regulate Na⁺ Channels?

Francois Verrey, University of Zurich, Switzerland; **Peter Smith**, Medical College of Pennsylvania

Socratic Debate: Are Amiloride-Sensitive Na⁺ Channels in Nonepithelial Systems the Same as Those in Epithelia?

Mortimer Civan, University of Pennsylvania

James Bubien, University of Alabama at Birmingham; **Douglas C. Eaton**, Emory University School of Medicine

Na⁺ Channels in the Lung

Pierre Barker, University of North Carolina

Pascal Barbry, CNRS, France; **Barbara Grubb**, University of North Carolina; **Hugh O'Brodovich**, Hospital for Sick Children, Toronto, Canada; **Sadis Matalon**, University of Alabama at Birmingham; **Jackson Stutts**, University of North Carolina; **Y. Berthiaume**, Hotel-Dieu, Montreal, Canada; **Colleen Talbot**, University of North Carolina; **Sandra Guggino**, Johns Hopkins University; **Yoshi Marunaka**, Hospital for Sick Children, Toronto, Canada

SATURDAY, November 1, 1997

Sensory Transduction and Amiloride-Sensitive Cation Channels

Bernd Lindemann, University of Saarlandes, Germany

Carole Hackney, Keele University, UK; **Sue Kinnamon**, Colorado State University

Mechanosensitive Ion Channels

Cathy Morris, Ottawa Civic Hospital

Ching Kung, University of Wisconsin; **Martin Chalfie**, Columbia University; **Monica Driscoll**, Rutgers University; **Mouhamed Awayda**, Tulane University Medical Center; **Jean-Michel Achard**, Hopital SUD, Amiens, France

Na⁺ Channels and the Cytoskeleton

Fiona McDonald, University of Victoria, New Zealand

Adrianna Prat, Harvard Medical School; **Daniela Rotin**, Hospital for Sick Children, Toronto, Canada

Clinical Relevance of Amiloride-Sensitive Na⁺ Channels in Genetic Disease

Michael Welsh, University of Iowa

David Warnock, University of Alabama at Birmingham; **Ric Boucher**, University of North Carolina

Structural Models of Amiloride-Sensitive Na⁺ Channels

Mauricio Montal, University of California at San Diego

Tom Kleymann, University of Pennsylvania; **Jean-Daniel Horisberger**, University of Lausanne, Switzerland; **Robert Guy**, NIH

Meetings

1998 APS Conference Endothelial Regulation of Vascular Tone: Molecular to Integrative Physiology September 16–19, 1998 • Augusta, GA Radisson Riverfront Hotel

ORGANIZER:

David M. Pollock
Medical College of Georgia

STEERING COMMITTEE:

Jennifer S. Pollock
Medical College of Georgia

John D. Catravas
Medical College of Georgia

L. Gabriel Navar
Tulane University

Harris J. Granger
Texas A&M University

Subsequent to the realization that endothelial cells are important regulators of vascular, immunological, and probably many other functions, endothelial cell biology has rapidly expanded into a distinct discipline. Simply in terms of vascular function, this relatively new area covers an extremely wide range of the more traditional disciplines, including physiology, pharmacology, and cell and molecular biology. The purpose of this conference is to present the most recent information on the interaction among major endothelial factors in the control of the vascular tone.

The conference brings together rapidly growing areas of endothelial cell biology so as to develop a more cohesive picture of the vascular endothelium as a physiological organ system. While the primary emphasis will be on specific mediators, related subjects such as shear stress and vascular remodeling will also be covered. Molecular and whole animal physiologists will demonstrate how their methodologies integrate into a central hypothesis and also define the similar aspects and unique mechanisms that exist among the different vascular beds. The conference is different from other vascular related meetings in that it attempts to bring together diverging areas of endothelial cell biology to develop a more cohesive picture of vascular endothelial function.

TENTATIVE PROGRAM

WEDNESDAY, September 16, 1998

Discovery of EDRF
Salvador Moncada, University College, London

Signal Transduction and Gene Regulation
Robert Highsmith, University of Cincinnati; **Rudi Busse**, J.W. Goethe University, Germany; **Ferid Murad**, Molecular Geriatrics; **Brian Duling**, University of Virginia

THURSDAY, September 17, 1998

Paracrine Regulation of the Renal Circulation
L. Gabriel Navar, Tulane University

Endothelial Control of the Renal Microcirculation
Josephine P. Briggs, University of Michigan; **Christopher Wilcox**, Georgetown University; **William J. Arendshorst**, University of North Carolina

Interaction of Nitric Oxide With Other Mediators
David Pollock, Medical College of Georgia; **Pam Carmines**, University of Nebraska; **Tom Hintze**, New York Medical College

Regulation of NOS in Vascular Smooth Muscle
Jennifer Pollock, Medical College of Georgia

TGF in Fibrotic Disease
Wayne Border, University of Utah

FRIDAY, September 18, 1998

Transgenic Mice as Models for Hypertension
Ed Shesley, Henry Ford Hospital

Endothelial Dysfunction: Pharmacology
Joan Kaiser, Parke-Davis; **Lou Ignarro**, University of California at Los Angeles; **Ulrich Förstermann**, Gutenberg University, Mainz, Germany

Endothelial Dysfunction: Pulmonary
Bruce Pitt, University of Pittsburgh; **John D. Catravas**, Medical College of Georgia; **Steve Abman**, University of Colorado

Endothelial Dysfunction: Cardiovascular
Richard Paul, University of Cincinnati; **Leslie Fuchs**, Medical College of Georgia; **Richard Cohen**, Boston University

Peptidase Activity in the Vascular Endothelium
Jim Ryan, Medical College of Georgia

Pivotal Role of Endothelium to Heart-Lung Transplantation
Sir Magdi Yacoub, Imperial College, London, UK

SATURDAY, September 19, 1998

Endothelial Regulation of Angiogenesis
Harris Granger, Texas A&M University

Vascular Remodeling
Mary Gerritsen, Bayer; **Gary Gibbons**, Stanford University; **David Harrison**, Emory University

Shear Stress
John Frangos, University of California at San Diego; **Robert Nerem**, Georgia Tech; **Barbara Ballerman**, Johns Hopkins

*Estrogen Modulation of the Vascular Endothelium:
Implications for Development of Coronary Artery Disease*
Virginia Miller, Mayo Clinic

Endothelial Gene Transfer in Restenosis
Elizabeth Nabel, University of Michigan

Meetings

1998 APS Conference The Paraventricular Nucleus of the Hypothalamus: A Crossroads of Integrative Physiology December 5–9, 1998 • San Antonio, TX The Menger Hotel

ORGANIZER:

Joseph R. Haywood

University of Texas Health Sciences Center, San Antonio

STEERING COMMITTEE:

Alan K. Johnson

University of Iowa

Arthur D. Loewy

Washington University

Leo P. Renaud

University of Ottawa

Catherine Rivier

Salk Institute

A. J. W. Scheurink

University of Groningen, The Netherlands

The paraventricular nucleus of the hypothalamus (PVN) serves as the crossroads of integrative physiology. This discrete hypothalamic area receives neural, humoral, and endocrine input regarding the state of the cardiovascular, endocrine, and immune systems, as well as fluid and electrolyte and energy balance. Integration of afferent inputs results in efferent neural or hormonal regulation of specific organ systems. This conference will bring together scientists who study different physiological systems and who use a variety of technical approaches ranging from molecular biology to whole animal physiology. The goal will be to understand how the PVN integrates afferent information, controls specific physiological functions, and coordinates interactions among organ systems.

TENTATIVE PROGRAM

Anatomy, Neural Pathways and Neurochemistry

Arthur Loewy, Washington University; **Paul Sawchenko**, Salk Institute; **Larry Swanson**, University of California at Los Angeles

Integration of Ingestive Behaviors

Alan Kim Johnson, University of Iowa; **Glenn Stanley**, University of California at Riverside; **Stephen Woods**, University of Washington; **Joseph Verbalis**, University of Virginia; **John Wright**, Washington State University

Role in Metabolism and Energy Balance

Anton J. W. Scheurink, University of Groningen, The Netherlands; **John Vissing**, University of Copenhagen, Denmark; **Barry Levin**, Veterans Affairs Medical Center, East Orange, New Jersey; **Gerjan van Dijk**, University of Washington; **Martine Orosco**, College of France

Neuroendocrine Regulation

Leo P. Renaud, University of Ottawa; **Stanley Watson**, University of Washington; **Ruud Buijs**, Netherlands Institute of Brain Research; **Charles Bourque**, Montreal General Hospital; **William Crowley**, University of Tennessee; **Paul Plotsky**, Emory University

Stress and the Immune System

Catherine Rivier, Salk Institute; **Serge Rivest**, Laval University; **Dwight Nance**, University of Manitoba; **Adrian Dunn**, Louisiana State University Medical Center; **James Herman**, University of Kentucky

Control of Cardiovascular-Renal Function

Joseph R. Haywood, University of Texas Health Sciences Center, San Antonio; **Steven Bealer**, University of Tennessee; **Quentin Pittman**, University of Calgary; **Marianna Morris**, Bowman Gray School of Medicine; **Kaushik Patel**, University of Nebraska; **Alastair Ferguson**, Queen's University at Kingston

“Peer Review Notes” Available Exclusively Online

The NIH Division of Research Grants has converted its “Peer Review Notes” from print to electronic format.

Effective with the February 1997 issue, this publication that informs NIH consultants and staff three times a year of new developments in grant application review policies and procedures will be available at <http://www.drg.nih.gov/prnotes/prnotes.htm>. Back issues are also available on the site.

House Bills Would Eliminate Dog Dealers

Two bills have been introduced in Congress that would make it virtually impossible for some researchers to obtain non-purpose-bred dogs and cats. The two bills are H.R. 594 ("Pet Safety and Protection Act of 1997") and H.R. 635 ("Animal Welfare Act Amendments of 1997"). This legislation is the product of a concerted effort by animal activists to portray researchers as cruel and uncaring. It is important for the research community to let Congress know the truth about this legislation.

H.R. 594 and H.R. 635 are couched in terms of protecting family pets from being stolen and sold to research labs. Despite sensational stories in the tabloid media, the allegation that there is massive pet theft to supply dogs and cats for research has never been proven. Nevertheless, these bills would either eliminate USDA-licensed Class B animal dealers (H.R. 594) or make it extremely difficult for those who can now legally supply animals either to Class B dealers or directly to research institutions to continue to do so (both bills). This would have a devastating impact on research that relies upon animals that are large in size, physiologically mature, or aged and come from random genetic backgrounds. Such animals cannot readily be obtained from Class A breeder-dealers, and in places where pounds cannot or will not provide animals for research, Class B dealers are the last available source.

This month, we are providing an analysis of what the first bill, H.R. 594, would do. Use this background information to write to your Representative to explain that this bill would harm research without protecting pets. Congress constantly hears negative comments about research from animal rights activists, so it is important to write even a short letter in order to correct any misimpressions. If your Representative is sponsoring this legislation, urge him or her to withdraw support from the bill. ♦

"Pet Safety and Protection Act of 1997" (H.R. 594)

Sponsors:

Reps. Charles Canady (R-FL) and George Brown (D-CA)

Overview:

H.R. 594 is based on the false assertion that research facilities routinely receive large numbers of stolen pets. This is untrue. Although the Animal Welfare Act (AWA) already contains provisions to keep pets out of research facilities, H.R. 594 would take the unnecessary step of eliminating virtually all the current legal sources of non-purpose-bred dogs and cats for research. H.R. 594 is based on a myth and will not protect pets, but it can impede research.

Under H.R. 594:

- USDA-licensed Class B dealers could no longer supply dogs and cats for research.
- Privately-operated shelters could no longer make dogs and cats available for research.
- Publicly-operated pounds could not supply dogs and cats for research unless they register with USDA. Those pounds might also have to comply with AWA standards for housing, sanitation, nutrition, and veterinary care of their animals. This would discourage many from providing animals for research since pounds that do not do so would not be asked to register or meet AWA standards.
- Individuals could donate dogs and cats for research only if they had bred and raised them or had owned for at least one year prior to the donation.
- Dogs and cats could be obtained from other USDA-licensed research facilities.
- The bill would take effect three months after passage.

Cosponsoring Representatives:

Ken Calvert (R-CA)
Thomas Davis III (R-VA)
Rosa DeLauro (D-CT)
Peter DeFazio (D-OR)
Elizabeth Furse (D-OR)
Porter Goss (R-FL)
Wally Herger (R-CA)
Henry Hyde (R-IL)
Gerald Kleczka (D-WI)
Jim Leach (R-IA)
David McIntosh (R-IN)
Carrie Meek (D-FL)
George Miller (D-CA)
John Murtha (D-PA)
Frank Pallone, Jr. (D-NJ)
Christopher Shays (R-CT)
Lynn Woolsey (D-CA)
Sidney Yates (D-IL)

APS Position:

APS opposes this legislation because it would eliminate non-purpose-bred animals from research. APS represents more than 8,000 scientists who conduct research on the workings of the organs and systems of the body. Many APS members use animals in their research, and the Society has a long-standing commitment to humane animal care.

H.R. 594 is based upon the false assertion that millions of family pets are stolen each year and sold for medical research. This has never been proven, yet the accusations keep surfacing.

USDA collects annual statistics on how many dogs, cats, and other animals are used in medical research and education. In FY 1995, the numbers were 90,000 dogs and 30,000 cats. The National Association for Biomedical Research estimates that about half these animals were purpose-bred for research by Class A-licensed animal breeders. The other half were non-pur-

(continued on page 109)

Public Affairs

Schafer Visits Capitol Hill



APS Past President James Schafer congratulates Rep. Nancy Pelosi (D-CA), a corecipient of the 1997 FASEB Public Service Award. Rep. Pelosi and former Sen. Nancy Landon-Kassebaum Baker were honored for their strong support of biomedical research. While in Washington, Schafer also met with key Congressional staff to discuss the just-concluded budget agreement and prospects for NIH funding.

(continued from page 108)

pose-bred animals supplied by Class B dealers, pounds and shelters, and a small number of donations by individuals. The allegation that millions of pets are stolen for medical research is ridiculous because research involves so few non-purpose-bred dogs and cats. However, while few in number, these animals cannot easily be replaced by ones that are purpose-bred.

Non-purpose-bred dogs and cats are used in research on problems such as cardiovascular disease, neurological disorders, shock-trauma, and diseases of the bones and joints. This research sometimes requires animals that are large, physiologically mature or even elderly, and free from shared inbred traits. H.R. 594 would eliminate all significant sources of non-purpose-bred dogs and cats for research. It would end Class B dealer sales of dogs and cats for research while imposing burdensome restrictions that would discourage public pounds from providing ani-

mals for research as well as preventing prevent private shelters from doing so. There would be nowhere else for researchers to go, particularly for larger and older animals that it would be virtually impossible for breeder-dealers to supply.

One can never prove that none of the non-purpose-bred dogs and cats used in research is a lost or stolen pet. However, the chance that a lost pet will end up in a research lab is remote. Despite what the tabloid media say, pet theft is extremely rare, and there is no evidence that stolen animals are being systematically supplied for research. Researchers do not want or need to use pets, and they want the public to feel confident that research animals are not pets.

AWA specifies that Class B dealers may only purchase dogs and cats for research from specific sources: either the animal's original owner, another licensed Class B dealer, or a pound or shelter. AWA further requires Class B dealers to keep records of who sold

them each dog or cat. It also requires mandatory holding periods at both pounds and shelters and Class B dealers before animals can be sold to research facilities so that owners will have time to reclaim lost pets. Furthermore, most research facilities voluntarily screen non-purpose-bred dogs and cats for tattoos or microchips that might signify that they are lost pets.

Then what happens to missing pets? Most missing pets get lost. Some are picked up by animal control and are among the ten million unwanted dogs and cats each year that are put to death in pounds and shelters. Others may be the victims of traffic accidents or attacks by other animals. H.R. 594 will do nothing to reunite any of these lost pets with their owners.

APS supports enforcement of existing AWA provisions regarding Class B dealers and believes that this will promote public confidence in their pets' safety. H.R. 594 will not protect pets, but it can impede research. ♦

Appeals Court Denies Academy Appeal in *Guide* Case

The US Court of Appeals for the District of Columbia has refused to reconsider a January decision that would require National Research Council (NRC) advisory committees to open their deliberations to the public. The May 6 ruling denied a motion for the case to be heard by the full Appeals Court.

At issue is a suit by the Animal Legal Defense Fund alleging that the NRC's Institute of Laboratory Animal Resources (ILAR) violated the Federal Advisory Committees Act (FACA) when it conducted private deliberations to revise the *Guide for the Care and Use of Laboratory Animals*. On January 10, a three-judge panel of the US Court of Appeals ruled that NRC expert panels are, in essence, advisory committees to the federal government because of the way their advice is utilized by government agencies. The National Academy of Sciences (NAS) argued that Congress never intended the FACA law to apply to its advisory panels.

Meanwhile, several environmental organizations have also sued the acade-

my to open up other advisory committees' deliberations to the public.

NAS President Bruce Alberts issued a statement saying that NAS was "deeply disappointed" by the court's action and would appeal to the Supreme Court. In the meantime, NAS and its sister organizations, the Institute of Medicine and the National Academy of Engineering, are "considering the rulings implications for how ... [to] provide independent, objective advice to the government and the public on matters of science and technology."

The appeals court action had been anticipated since the January 10 decision had been based upon an earlier Supreme Court decision (*Public Citizen v. United States Department of Justice*). In that decision, the Supreme Court reasoned that the FACA law should apply to committees formed by quasipublic organizations, such as NAS, that are utilized by federal agencies for advice or recommendations. Under FACA, appointees to federal advisory committees must be selected to represent balanced viewpoints, meetings must

be open to the public, and the public must be allowed access to all documents and deliberations.

The Alberts statement noted that NAS is "committed to providing high-quality, objective, and independent advice to the nation" on "very difficult issues, where the public mistrusts the government or where the Congress and federal agencies have conflicting policy views."

"The process by which the academy conducts its work ensures its independence from potential outside influences and political pressures from government officials, lobbying groups, or others," Alberts stated. He expressed concern that the academy's credibility would be "severely compromised" if it were made subject to FACA.

"We are beginning intensive discussions with federal agencies regarding new approaches for carrying out our future studies that will allow us to continue to conduct our work as the nation's independent science adviser in a manner that is consistent with the letter and the spirit of the law," Alberts said. ♦

NSF Approves New Merit Review Criteria

NSF has approved two new merit review criteria that will be used beginning October 1, 1997. The criteria, developed by a task force on merit review, were revised slightly as a result of comments provided by the research community.

The final version of the criteria calls for reviewers to determine the intellectual merit and quality of the proposed activity and its broader impacts. Each criterion is accompanied by a series of questions to identify relevant considerations.

The questions to accompany the intellectual merit and quality criterion are:

- How important is the proposed activity to advancing knowledge and understanding within its own field and across different fields?
- How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, please comment on the quality of prior work.)
- To what extent does the proposed activity suggest and explore creative and original concepts?
- How well conceived and organized is the proposed activity?
- Is there sufficient access to resources?
- How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
- How well does the proposed activity broaden the participation of under-
- represented groups (e.g., gender, ethnicity, geographics, etc.)?
- To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?
- Will the results be disseminated broadly to enhance scientific and technological understanding?
- What may be the benefits of the proposed activity to society?

One concern APS raised in its comments was that not all proposals would score well on both criteria. Instructions to reviewers will now make clear that the two criteria "need not be weighted equally." Reviewers will be asked to provide separate comments for each criterion, a single composite rating of the proposal, and a summary recommendation that addresses both criteria. ♦

NASA Ends Bion Studies Due to “Unexpected” Risk

On April 22, NASA announced that it was suspending its participation in the Bion 12 satellite mission. The decision was based on the findings and recommendations of an independent review panel convened to investigate the post-flight death of one of the two rhesus monkeys that flew aboard Bion 11.

Last year, animal rights activists mounted an intensive campaign to pressure Congress to cancel US participation in the Bion 11 and 12 missions on the grounds that animal studies are unnecessary because humans are spending extended periods in space. The research was intended to study the physiological effects of low gravity and space radiation using primates and involved postflight performance testing and the collection of tissue samples. APS and other organizations such as FASEB, Association of American Medical Colleges, Association of American Universities, and National Association of State Universities and Land Grant Colleges successfully urged Congress not to interfere with NASA's decision to proceed with research that had undergone numerous reviews for scientific merit and appropriate use of animals.

At issue were multiple studies by

US, French, and Russian investigators involving a total of four monkeys aboard two Russian, specially-outfitted Bion satellites. Four was deemed to be the minimum number of research subjects needed to produce statistically valid results.

The Bion 11 satellite was launched on December 26, 1996, and the two monkeys returned safely to Earth at the completion of their two-week mission. However, the next day one of the monkeys died due to an unexpected, adverse reaction to anesthesia after routine surgery to collect bone and muscle samples. The second monkey also reacted badly to the anesthesia, but it survived. The research protocols, which called for collecting tissue samples immediately postflight, represented the first time animals were placed under anesthesia so soon after prolonged weightlessness. At the end of postflight studies, the monkeys were to be retired to a Russian primate facility.

NASA's investigation was led by Ronald Merrell, chairman of the Department of Surgery at Yale University. Merrell also headed last summer's special Bion review task force that approved the missions. The panel consulted closely with a simultaneous investigation com-

missioned by the Russian Academy of Sciences. The Merrell panel found that there was “an unexpected mortality risk associated with anesthesia for surgical procedures,” and therefore the Bion 12 research protocols were now deemed to pose an “unacceptable risk” to the primates. Since changing the protocols would mean that data from the two missions would no longer be comparable, NASA opted to suspend participation in Bion 12.

NASA now plans to incorporate the new information from Bion 11 into its ongoing scientific research and into medical considerations for future space flights. NASA also plans to consult with the biomedical research community concerning “appropriate models to investigate medical care in relation to space physiology” as well as the development of “new technologies for collecting critical data needed to continue this important research.” Among the questions to be explored are what microgravity-produced changes affect the body's ability to metabolize anesthesia or other drugs and how this will affect future space travelers who need urgent medical care. ♦

Trust Fund Legislation Introduced

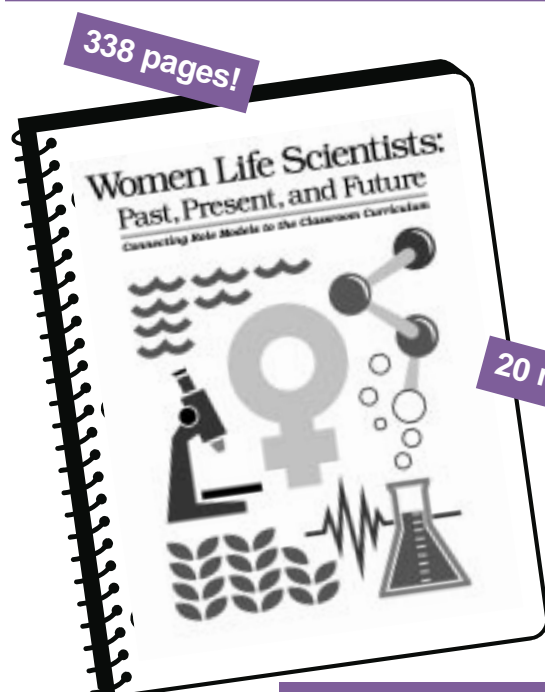
Senators Tom Harkin (D-IA) and Arlen Specter (R-PA) have introduced legislation, S. 441, to create a National Fund for Health Research. This trust fund would be financed by a 1% tax on all health insurance premiums, phased in over four years, and would provide resources to NIH as a supplement to its regular appropriations. In 1995, a similar plan was proposed by then-Sen. Mark Hatfield (R-OR) and Harkin.

Harkin and Specter estimate that the National Fund for Health Research would provide a 50% increase in NIH's

research funding. NIH would manage the fund, which would be disbursed only if total NIH appropriations were equal to or greater than the previous year's appropriations. Ninety-five percent of the funds generated would be allocated to NIH institutes and centers in the same proportions relative to the regular appropriations process. In addition, 2% of the trust fund would go to the Office of the Director, 2% to the National Center for Research Resources, and 1% to the National Library of Medicine.

Concerns exist that the National Fund for Health Research could be used to replace the regular appropriations process for NIH. However, in a release marking the unveiling of S. 441, Harkin said he sees the bill as a creative way to provide additional funding for NIH. “We face tough budgetary times,” Harkin said. “Money is tight. We need a creative, common sense, and constant source of additional funding to support health research. Our proposal will save money, save lives, control health care costs, and strengthen our economy.” ♦

NEW! Life Sciences Modules for Outreach to Students



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Eight Outreach Teams Named for 1997-98

Council has approved eight new Local Outreach Teams (LOT) nationwide to conduct professional development workshops for middle and high school teachers within their local communities. The workshops will allow teachers to explore hands-on, inquiry-based physiology activities appropriate for use in their classrooms. Each LOT is chaired by an APS member who will work with other physiologists, local teachers, and local science education administrators to present these activities to their middle and high school colleagues. The 1997-98 LOTs join a network of 11 APS outreach teams that have delivered these physiology training materials to more than 200 science teachers nationwide over the past two years.

Several LOTs will involve past APS Summer Research Teacher (SRT) fellows as team members: Nancy Palaez, '93 SRT, and Sandra Mahl, '96 SRT (Indianapolis, IN, LOT); Teri Sheldahl, '96 SRT (Albuquerque,

NM, LOT); and Dianne Morris, '95 SRT, and DeLois Harris, '96 SRT (Tyler, TX, LOT).

Members from each LOT will attend an outreach institute on June 26-29 in Warrenton, VA, to learn about workshop materials and strategies. Two workshops

high school teachers focuses on exercise physiology and cardiovascular fitness. These activities were developed and field tested by the 11 LOTs established in 1995-1997.

Each LOT will conduct a one- to two-day workshop for 25 to 35 local science teachers in the fall of 1997. Follow-up sessions in the spring will focus on sharing strategies for using the workshop materials in class, Internet exploration, and/or tours of research facilities. APS provides funds to LOTs for workshop materials, teacher stipends, and publicity costs.

For information on an LOT in your area or for application information on establishing an LOT, contact Marsha Lakes Matyas, Education Officer, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991. Tel: 301-530-7132; fax: 301-571-8305; e-mail: educatio@aps.faseb.org. ♦

Candace B. Matthews

US Army Research Institute of Environmental Medicine

C. Subah Packer

Indiana University School of Medicine

Barry T. Peterson

University of Texas Health Science Center at Tyler

James C. Schadt

University of Missouri at Columbia

R. John Solaro

University of Illinois at Chicago

Gerald K. Weiss

University of New Mexico School of Medicine

James Will

University of Wisconsin at Madison

Stephen C. Wood

East Carolina University

are currently being conducted by LOTs. The *Neural Networks* workshop for middle school teachers explores the anatomy and physiology of reflexes and reactions. The *Physiology of Fitness* workshop for

Volunteer! Become A Contact for a Summer Research Teacher

The APS Education Office invites you to volunteer and serve as a contact and/or research host for a middle or high school science teacher in your community who is interested in doing physiology research in a laboratory during the summer of 1998. Information on APS contact persons is included in the application form for the *Frontiers in Physiology* Summer Research Program, distributed each summer. We are especially in need of contacts in or near Idaho, Nevada, Rhode Island, Vermont, and Wyoming, states where we currently have no APS contacts for teachers.

Contact persons provide a first point of contact for teachers interested in the *Frontiers in Physiology* Summer Research Program. By talking with teachers, the contact can determine their research interests and backgrounds and guide them to other APS members who are interested and able to serve as host researchers. Of course, contact persons often decide to host teachers in their own laboratories!

Applications for the 1998 Summer Research Program will be distributed in August 1997. Queries from teachers can be expected from September through

December 1997. **The deadline for 1998 applications is January 9, 1998.**

If you are interested in being a contact person and/or research host or would like more information, please notify Marsha Lakes Matyas, Education Officer, American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991. Tel: 301-530-7132; fax: 301-571-8305; e-mail: educatio@aps.faseb.org. Please be sure to include your mailing address as well as your e-mail address. ♦

Mentoring: A Position of Responsibility

It brought me up short when I was asked to write an essay on mentoring. I look back and ask, "Why did I have this surprising reaction?" After all, I have been mentoring students ever since I can remember. Yet, I have never given the subject any serious thought! I have just coached, advised, or otherwise directed all of my students and postdoctoral fellows in terms of the things that I deem important to become a good scientist, teacher, and citizen. Therefore, to be asked to describe for my fellow physiologists how I have mentored all these years became a fascinating challenge.

It is a challenge that has taken me down interesting paths. For example, when I looked up the term in the dictionary, I discovered its meaning depended on whether it was capitalized or not. **Mentor** — (from Greek) — was a friend of Odysseus who was entrusted with the education of Odysseus' son. But mentor — when not capitalized means: **mentor** — a.) a wise and trusted counselor or guide; or b.) a tutor or coach. Having gone that far, I decided I had better ascertain what Webster thought about counselors, guides, tutors, and coaches.

counselor: a person who gives advice; one who has supervisory duties at a summer camp.

guide: one who leads or directs another's way; a person who exhibits and explains points of interest; a person who directs another's conduct or course of life.

tutor: one charged with the instruction and guidance of another; a private teacher; to teach or guide usually individually in a special subject or for a particular purpose.

coach: one who instructs or trains a performer; one who instructs players in the fundamentals of a competitive sport.

After reading the preceding definitions, I felt somewhat daunted and was rather happy I had never previously

thought or verbalized about the responsibilities one assumes as a mentor. The title "graduate student advisor," however, never scared me. In fact, I have thoroughly enjoyed that role for more than 40 years. Therefore, in the next few paragraphs I will try to share with you my perceptions of how I interact with my students and postdoctoral fellows. Perhaps in a sequel to this essay students could spell out their perceptions of a mentor.



Beverly P. Bishop

Mentoring and teaching have been primary goals with me, whereas net research production has not. Therefore, one of my major objectives with graduate students is to train them to become independent investigators. I purposely give them wide opportunities for making and learning from their own mistakes. With this freedom, they must, for example, assume responsibility for formulating their own research problems. Whenever students arrive at their own decisions, the results are usually far more satisfactory than when the decisions are imposed by the advisor. Students soon learn in the experimental environment that knowledge and understanding come primarily from persistence and determination and with considerable trial and error.

At the outset of students' laboratory training, I try giving guidance by asking provocative questions concerning their reasoning and actions. When they have a successful experiment, I revel with them because I want them to experience the satisfaction, the joy of learning, and the excitement of contributing new information to this complex world's fund of knowledge. There is nothing that does not appear marvelous when it comes to our knowledge for the first time. When students' experiments do not go as expected, I try to encourage them by reminding them of the old adage: some defeats are more triumphant than victories.

Students soon recognize that experimentation is only half the battle of becoming a respected investigator. Coping with the ever-growing volume of today's scientific literature is another key step in the education of a budding scientist. A student must become a critical consumer of this great body of knowledge. Students quickly learn to identify the strengths and weaknesses of published papers by having to present journal articles and discuss them with peers and advisors in congenial "journal club" sessions. Development of critical thinking is an essential learning experience for it prepares a student to shoulder subsequent editorial responsibilities. The student must also learn to store and retrieve information because information you cannot find is information you cannot use. Initially, students feel competent at this task because of their keen memories and today's Medline-type databases. In time, however, even the most organized individual may become overwhelmed by the ever-increasing volume of new information. In addition to the need to keep up with current events, it is equally important that students acquire respect for and an appreciation of the history of their field. (I have an expertise in this area because I have had the privilege of living it!)

Career Corner

Another universal problem with which students and faculty alike must cope is the scarcity of time to carry out the responsibilities with which they are charged. One of life's most valuable lessons is to learn that focusing and utilizing time wisely are essential ingredients for success. Aspirations are achieved when priorities are established and objectives are kept in focus. I find deadlines deadly. Therefore, I struggle to keep well ahead of them to avoid last-minute rushes. I silently hope my students will learn to follow my example, but individual variation is so great in this respect, I have never accurately predicted which of my students will emulate my example.

I strongly believe that a job worth doing is worth doing well. I often think about one of my students who was questioned after a supervised lecture about why she had presented the class with misinformation about a particular physiological mechanism. Her answer was, "No one in that audience would know the difference." In response, I expressed how much her explanation disturbed me. I live by the principle that you always assume that your audience has experts checking the authenticity of your every word. I expect students and lecturers to be conveying intellectual material as accurately as current knowledge permits. In general, my creed is that every task undertaken shall not only be completed but completed in as competent, accurate, and thorough a way as possible.

Communication in writing and speaking is the hallmark of a good scientist. Both writing and speech are skilled voluntary activities that require years of

training and practice. The earlier in life one begins to hone these skills, the better the performance in adulthood. Properly selected written words have an intrinsic power, but their real power is derived from their logical sequencing when expressing innovative ideas as the outcome of critical thinking. Some individuals seem to have this talent as an innate ability. What a joy to be their mentor!

All students work hard at their writing. Thus, to have their efforts criticized

today's students no longer face this inquisition-type experience. I do not know whether suffering brings wisdom. I do know facing an audience remains a challenge for most students. Someone once said, "A sitting audience is like hungry guests." I tell students they will be OK if they have prepared an attractive, tasty, hearty meal. I also remind them it is better to be the actor than the critic.

As a mentor, I have been blessed over the years with the world's most wonderful students. They joined the physiology graduate program from nursing, physical therapy, biology, biochemistry, and other programs. Postdoctoral fellows from several parts of the world came not only from physiology but from engineering, graduate education programs, pulmonary function clinics, and other disciplines. Their destinations after leaving my laboratory have been equally diverse. Despite their diversity in professions and person-

alities, they have several traits in common. All are independent but sufficiently conformist and honest to comply with codes of ethics. They are free spirits yet absolutely dependable. They are self-motivated and display leadership qualities. After leaving my laboratory, they have gone in a variety of directions. With few exceptions, the friendships we established during their tenure under my guidance have been sustained over the intervening years. I continue to take pride in their current accomplishments. In some respects mentoring is like being a surrogate parent. ♦

Beverly P. Bishop

State University of New York at Buffalo

One Physiologist's A, B, Cs of Mentoring

Train students to become independent investigators by teaching them to:

- Accept criticism graciously
- Become focused and organized
- Cope with the burgeoning scientific literature
- Develop critical thinking and logical sequence of ideas
- Experience satisfaction and joy from his endeavors
- Finish tasks undertaken
- Give their best at all times
- Hone communication skills in writing and speaking

is a difficult pill to swallow. For some students, accepting criticism is one of the toughest parts of graduate training. But learn they must; otherwise, they will never be able to cope with future pink sheets from reviewers of submitted papers or grant applications. When I was a graduate student, rehearsing for an upcoming presentation at a professional meeting was the greatest torture I ever experienced! You would present your very best performance only to have it torn apart. Second and third rehearsals would go better, and by the time of the real presentation you were prepared to handle any questions or criticisms the audience might throw at you. Because these horrendous experiences made such an impact on me, I lament the fact that

Positions Available

There is a \$50.00 charge for each position listed. Positions will be listed in the next available issue of *The Physiologist* and immediately upon receipt on the APS Gopher Information Server. A check or money order payable to "The American Physiological Society" must accompany the position listing. **Copy must reach the APS office before the first of the month, one month preceding the month of issue.** Mail copy with payment to: *The Physiologist*, APS, 9650 Rockville Pike, Bethesda, MD 20814-3991.

Careers in Physiology at Primarily Undergraduate Institutions

What is it like being a physiologist at a liberal arts college or a small university characterized as a primarily undergraduate institution (PUI)? I would like to discuss this from my personal experience of teaching in such institutions for the past 29 years.

When I was nearing completion of my doctoral studies, I began to think seriously about the next step in my career. Having just come through a turbulent time in US history — the Vietnam War was having its divisive effect on campuses coast-to-coast in 1968 — I was looking, personally, for a change from what I perceived as the academic rat race of 18- to 20-hour days in the laboratory; the ever-increasing pressure of obtaining grant funds, even then; and the defining symbol of career progress, number of publications per year, translating to tenure and promotion. I wanted something different, something kinder and gentler, to quote a former chief executive of a well-known Western power.

In retrospect, what I was looking for was an environment not unlike the one I had been in as an undergraduate, one in which the professor of a class actually got to know you on a first-name basis and one in which a student's individuality was not drowned in the sea of faces a lecturer typically encounters in a research university's lecture hall. I had seen the latter in my role as a graduate assistant at Purdue University. The course I taught had more than 1,400 students. Lectures were delivered three separate times because the lecture hall could not accommodate the entire class at once. Even the laboratory sections were huge, with 36 students trying to do nerve conduction experiments in one room.

Instead of applying for a postdoctoral fellowship, I decided to see what was available at small liberal arts colleges or smaller state colleges in the field

of physiology. At the end of the 1960s, there seemed to be a lot of jobs available for a fresh PhD from a Big Ten university. One small school contacted Purdue to see if someone, anyone, would come, sight unseen, to be a professor and serve as Chair of its Science Division. The counsel I got from my major professor, as well as the small voice inside of me, was, "Say thank you very much, but I don't think so." Several schools heard about my availability through the university's placement service and some



David S. Bruce

through personal contact with a physiological system salesman who serviced schools throughout the Midwest. I actually interviewed at some of them, finally deciding on a small liberal arts college on the West Coast, where I began my career as an Assistant Professor of Biology in the fall semester, 1968.

One of the reasons so many liberal arts colleges were interested in my candidacy was because, in addition to a respectable list of publications, I had had actual teaching experience in both the classroom and laboratory during my graduate training. I had been a graduate teaching assistant with responsibility for running a number of human physiology laboratories and had also lectured to a class of 1,400 on several occasions. I had had similar experience in a second

course at Purdue as well, a dual-level undergraduate/graduate course.

So, one of my pieces of advice to those of you who are still graduate students is to gain some teaching experience during your training, especially if employment at a smaller school is one of your goals. Some graduate programs have no mentoring program for learning how to teach one's subject, as they do for learning how to be an independent investigator. That is unfortunate and should change. Fortunately for me, Purdue did have at least a rudimentary program like that. All graduate assistants had to take a seminar on teaching in the biological sciences and received feedback from departmental professors on their presentations.

At a typical research university, those with tenure-track positions are teaching one or two courses per year, with 80% or more of their time dedicated to advancing the knowledge frontier by conducting independent research and directing graduate students. Teaching in a small liberal arts college, one is expected to spend most of her/his time teaching. In some liberal arts colleges, professors are teaching 100% of the time, with 12 to 18 more contact hours per semester (the equivalent of 6 or more courses and laboratory sections per year) or even more. At many of these colleges, there is no expectation for scholarly research and therefore no time to do it.

At the better liberal arts colleges, scholarly work is expected, but the percentage of one's time available varies considerably between schools. At our college, scholarly research and publications are definitely required for promotion and tenure, but the pressure is not as real and onerous as it is at research universities. We are now working on receiving teaching credit for research we do with small groups of students, but at many colleges there is no such arrangement. You have to find a way to carve out time and support for the research you want to do while carrying essentially a full teaching load.

This article is based on remarks presented at the Careers in Physiology Symposium at Experimental Biology '97 in New Orleans, LA.

Career Corner

Back when I was in graduate school, we did a master's thesis first along with two languages, chosen from Russian, German, and French. Next was the PhD preliminary exam (during which we were told we could be asked anything about anything). Then came the PhD research and dissertation. If you are like I was at the end of six years, you may be a little burned out and ready for a time when there are no or few research expectations. I thought I would never do research again, willingly, after completing my PhD. At my first academic appointment, little research was expected, and there was no support for it. However, after a year or so, I found I missed it. I needed the intellectual challenge; I still had some questions I wanted to find answers to from my dissertation research and others that kept creeping through my little gray cells. It was this yearning for more research opportunities that brought me back to the Midwest 23 years ago to Wheaton College.

I think I may have the best job of any physiologist. I get to work with some of the brightest students anywhere, teaching and learning with them in relatively small classes and conducting research in my areas of training, cryobiology, temperature regulation, and the physiology of hibernation. Well-prepared and highly motivated students clamor to work with me on these projects, which are funded partly through the college, partly by grants from various foundations, and partly from grants via a collaborator at a research university, a biochemist with whom I have been working for about 18 years now. I think one of the benefits of working in such a small school environment is that there is less pressure to publish in "name" journals and less pressure to work in mainstream, "cutting-edge" areas, where more funding is available if not easy to get. One is allowed to pursue one's own research interests more. To be sure, there is probably less money available for such endeavors, but the corollary is that often much less is required.

On the other hand, NSF has recently become enamored with teaching and education, close interactions with students, and high-quality research with students — all those things which have long been strengths of quality PUIs. An undergraduate physiology professor with a little marketing skill and creativity can often foster cooperation between local businesses or industries and her/his institution, gaining dollars to support undergraduate research. In the process, all parties win. The business is cited for helping colleges do excellent teaching and research, the students involved get the unmistakable boost that undergraduate research gives their budding careers, the college is seen as being on the "cutting edge" of higher education, and even the professor is seen as one who is both modeling what a scholar does as well as talking about what scholars have done in class.

Will any of us win the Nobel Prize in Physiology or Medicine? Probably not. We tend to try to answer small questions, hopefully of significance, in experiments designed to be completed in a relatively defined period of time, typically a summer or perhaps a semester. For example, I require that all students working with me be involved in all phases of the project: computer literature search, definition of the problem, forming a hypothesis, designing the experimental protocol to test the hypothesis, execution of the experiment, data analysis, drafting of a paper/poster for presentation at the Experimental Biology meeting and other conferences, and writing a paper for submission to a peer-reviewed journal for publication. Students working on the project are all listed as authors on presentations or publications. Over the years, for many students it has been their entry into the world of high technology and research in biomedical fields. This is a very rewarding enterprise for the professor who loves working with students and seeing them succeed in their quest to enter academia.

So, how do you find positions at PUIs? Most of the really good colleges

advertise positions in *Science*, just like research universities do. *The Chronicle of Higher Education* is another good source. Both *Science* and *The Chronicle* have on-line job listings with search capabilities that new recruits will find easy to navigate and use. Many scientific societies have job/position newsletters or placement services, and many also have education offices (APS, American Society for Cell Biology, American Society for Microbiology) with contact persons who can point seekers in the right direction.

The journal of the American Institute of Biological Sciences (AIBS), *BioScience*, lists positions open in the back of most issues. *The Scientist*, a biweekly publication out of Philadelphia, has a regular section on "Positions Open." Usually, these are at industrial sites or research universities, occasionally at liberal arts colleges.

To be a successful candidate at a small college, you must make a good impression with your teaching ability and style. Most colleges will have you teach at least one class during your interview trip. You will be evaluated by faculty as well as students, probably. You should strive for a memorable performance in your "teaching interview." You should also have ideas about how you will engage undergraduates in research, making sure you choose projects doable in that environment. I would say, above all, you should demonstrate a collegial and cooperative personality and be able to convince the faculty of why you would enhance the education offered in their department. Breadth of training is usually expected, as you will likely be teaching lower level courses in biology, as well as freshman laboratories, in addition to animal or human physiology or perhaps anatomy and physiology. Potential collaborative work in research, either with another biologist at the college you are interviewing at or a research university nearby, can strengthen your candidacy. ♦

David S. Bruce
Wheaton College

People and Places

Greenwood Elected to Head AAAS

APS member **M. R. C. Greenwood** was chosen as AAAS's President-elect by the association's full membership during its annual meeting this February in Seattle. She is the fourth consecutive woman elected to lead AAAS. Greenwood's term as President begins in 1998 in conjunction with the association's sesquicentennial anniversary. In 1999, she will serve as chairman of the board.

Greenwood is a former Associate Director for Science at the US Office of Science and Technology Policy (OSTP) and is currently the Chancellor of the University of California at Santa Cruz. In August 1996, President Clinton appointed Greenwood to a six-year term on the National Science Board, whose 24 members recommend national policies for promoting basic research and education in the sciences to NSF. Green-

wood said the future funding of research depends on scientists' abilities to promote science. "One of the most important issues facing scientists now are the cuts proposed in science funding to balance the federal budget," Greenwood said. "In the long term, regaining the public's trust in science and, more importantly, finding ways to encourage bright, young to pursue careers in the field is vital."

A biologist by training, Greenwood spent more than 25 years researching cell biology, genetics, physiology, and nutrition with a particular emphasis on the genetic causes of obesity. Her research teams have examined the complex interplay among metabolism, development, behavior, and genetics that can lead to obesity. Greenwood was elected to the Institute of Medicine of



M. R. C. Greenwood

the National Academy of Sciences in 1992, emblematic of her distinguished service to the scientific community. ♦

Thorn Receives NAS's Most Prestigious Award

The National Academy of Sciences (NAS) has selected APS member **George W. Thorn** as its 1997 recipient of its most prestigious award, the Public Welfare Medal. Thorn was instrumental in the establishment and growth of the Howard Hughes Medical Institute, today the nation's largest philanthropic institution.

"Thorn's contributions to science, particularly his work in fostering scientific research and education through the Howard Hughes Medical Institute, span more than 40 years and are truly remarkable," said Peter H. Raven, NAS Home Secretary and Chair of the Selection Committee. "He has made a lasting contribution to the application of science to the public welfare." Established in 1914, the Public Welfare Medal, consisting of a bronze medal and an illuminated scroll, is presented annually to honor extraordinary use of science for the public good. Previous recipients include Vannevar Bush, C. Everett Koop, and Carl Sagan.

A noted endocrinologist, Thorn

first met the wealthy industrialist Howard Hughes in the 1940s and served for a time as his medical adviser. Their professional relationship inspired Hughes to donate money for medical research grants under Thorn's leadership. The grants evolved into a formal program of Howard R. Hughes Research Fellowships and culminated in the creation of the Howard Hughes Medical Institute in 1953.

Thorn led the institute in various capacities during the next 40 years, serving as its Director of Research, President, and most recently as Chairman of the Board of Trustees from 1984 to 1990. In addition to its Howard Hughes fellowships for individual scientists, the institute contributed to improvements in high school science education programs and awarded grants to universities under Thorn's leadership. Today, the institute employs more than 270 outstanding scientists who carry out basic biomedical research at 62 sites. Through its complementary grants program, the

Howard Hughes Medical Institute supports biomedical researchers outside the country and sponsors a major US science initiative.

Thorn, an early pioneer in the treatment of adrenal insufficiency, also held posts at several medical institutions, including Johns Hopkins Medical School and Harvard Medical School. From 1942 to 1972, he was physician-in-chief of Harvard's Peter Bent Brigham Hospital in Boston, where he helped develop the organ transplant program there. During his medical career, Thorn published several papers in the fields of endocrinology, renal failure, and general medical science. Colleagues have recognized Thorn's life-long achievements by awarding him more than a dozen honorary degrees and 47 other honors, including the American Medical Association's Gold Medal, the American College of Physicians' John Phillips Memorial Award, and the Association of American Physicians' George M. Kober Medal. ♦

Chien Elected to National Academy of Engineering

Shu Chien, Professor and Chair of the Department of Bioengineering at the University of California at San Diego School of Engineering, has been elected to the National Academy of Engineering (NAE). Chien is one of 85 engineers elected to the academy in 1997. Established in 1964, NAE currently consists of 1,893 academic and industry members representing all fields of engineering.

Election to NAE is among the highest professional distinctions accorded to an engineer. Academy membership honors those who have made important contributions to engineering theory and practice, including significant contributions to the literature, and those who have demonstrated unusual accomplishment

in the pioneering of new and developing fields of technology.

Chien was recognized for his research in atherogenesis, tissue engineering, blood rheology, microcirculation, and cell mechanics. Specifically, Chien and his colleagues have uncovered new details about how low density lipoproteins accumulate in the arteries. Their work is currently leading to animal trials of a new treatment for restenosis.

Chien is considered a pioneer in molecular, cellular, and tissue bioengineering and has made major contributions to the study of cardiovascular physiology. Chien received his MD from the National Taiwan University and his PhD from Columbia University. In addition to

NAE, he is a member of the Institute of Medicine of the National Academy of Sciences, the American Institute for Medical and Biological Engineering, and Academia Sinica. Chien has served as President of APS, Microcirculatory Society, American Chinese Medical Society, and FASEB. His numerous honors and awards include the Microcirculatory Society's Landis Award, the NSF "Special Creativity" Grant Award, the NIH Merit Award, and the 1990 and 1996 Melville Medals from the American Society of Mechanical Engineers for best scientific paper of the year. ♦

Hackney Receives Fulbright Scholar Award

APS Member **Anthony C. Hackney**, Associate Professor in the Department of Physical Education, Exercise, and Sport Science at the University of North Carolina at Chapel Hill, has been selected to receive a Fulbright Scholar Award for the 1997-98 academic year.

Hackney will be appointed to the Lithuanian National Institute of Physical Education. He will teach exercise physiology to graduate students at the institute, and his research will extend his work dealing with adaptations in the endocrine system in response to physical exercise training.

Hackney has been among the exercise physiology faculty members at the University of North Carolina at Chapel Hill for the last eight years. During this time, his work has involved collaborations with scientists from the Department of Defense, the National Academy of Sciences, and NASA. Hackney also holds faculty appointments in the departments of nutrition and physiology in the schools of public health and medicine at the university.

The Fulbright Program, established in 1946 by legislation introduced by program namesake and former Arkansas

Senator J. William Fulbright, is designed to increase mutual understanding between citizens of the US and other countries. The Fulbright Scholar Program, the senior scholar component of the Fulbright program, offers grants for college and university faculty as well as for professionals and independent scholars. Since 1946, nearly 32,000 American scholars have lectured and conducted research in countries around the world. More than 800 awards in nearly 130 countries are available during each competition. ♦

Burks Elected President of Texas Society for Biomedical Research

APS Member **Thomas F. Burks**, Executive Vice President for Research and Academic Affairs at the University of Texas Health Sciences Center at Houston, has been elected Board President of the Texas Society for Biomedical Research (TSBR).

Incorporated in 1989, TSBR is dedicated to ensuring the future of biomedical research in Texas. TSBR strives to achieve its mission through education and communication about the importance of biomedical research to the peo-

ple of Texas. Burks said one of the ways TSBR can achieve its mission is by interesting people in science.

"Our long-term aims (at TSBR) are to increase scientific literacy in Texas and to motivate talented students toward careers in science," Burks said. "TSBR serves to educate legislators, community leaders, and the general public about the importance of biomedical research and the essential role of research in improving human and animal health."

Burks said it is crucially important

that TSBR continues its unequivocal support of the animal research that is essential for medical progress. He said researchers must be constantly vigilant to guard against physical attacks on research facilities and attacks through the legislative process. "Unless we remain active and united in countering the shrill voices of animal rights activists, we will not be able to carry out valuable research, and our fellow citizens will be deprived of lifesaving advances in health care." ♦

People and Places

Joseph W. Barnard, formerly a research associate with the Department of Pharmacology, Rush Medical School, Chicago, IL, has accepted a position as a research associate with Otsuka American Pharmaceuticals, Inc., Rockville, MD.

Having accepted a position as a research associate with the Department of Sport Health Science, Life College, Marietta, GA, **Joseph Chromiak** is no longer associated with the Department of Pathology & Laboratory Medical Research, Brown University, Providence, RI.

Robert V. Considine had been affiliated with the Department of Medicine, Thomas Jefferson University, Philadelphia, PA. Recently, Considine became a postdoctoral fellow at the Indiana University School of Medicine, Indianapolis, IN.

Formerly, **Richard S. Fisher** was affiliated with the Department of Nephrology, Walter Reed Army Research Institute, Washington, DC. Presently, Fisher is a staff physiologist with the National Institute on Deafness and Other Communication Disorders, NIH, Bethesda, MD.

Accepting a position as an assistant director with the Central Research Division of Pfizer, Inc., Groton, CT, **David A. Fryburg** is no longer with the Department of Medicine at the University of Virginia Health Science Center, Charlottesville, VA.

Currently, a postdoctoral fellow in the Biology Department at the University of Detroit, Detroit, MI, **Gregory Michael Grabowski** had previously been a postdoctoral fellow in the Department of Physiology, Harvard School of Public Health, Boston, MA.

William Grossman, previously associated with Merck Research Laboratories, West Point, PA, has accepted an assignment as Professor and Chief of the Cardiology Division, Moffitt Hospital, University of California at San Francisco.

Recently, **Mark Eugene Gunning** was an assistant professor in the Renal Division at the New England Deaconess Hospital, Joslin Diabetes Center, Boston, MA. Currently, Gunning is an assistant professor affiliated with Four Corners Nephrology Associates, Farmington, NM.

Claudia Kasserra, formerly an associate scientist with Galileo Laboratories, Inc., Sunnyvale, CA, has moved to Vancouver, British Columbia, Canada, as an associate scientist with Inflazyme Pharmaceuticals, Jack Bell Research Center.

Charles H. Lang is now Professor of Surgery and Director of Surgery Research in the Department of Cellular and Molecular Physiology at the Hershey Medical Center, Hershey, PA. Prior to his new assignment, Lang was Professor of Surgery and Director of Surgery Research in the Department of Surgery, State University of New York at Stony Brook.

Accepting a position with the University of Melbourne, Parkville, Victoria, Australia, as a research fellow in the Department of Physiology, **Gordon S. Lynch** has moved from the Institute of Gerontology at the University of Michigan, Ann Arbor, MI.

Richard Murray McAllister was formerly a postdoctoral fellow in the Department of Veterinary Biomedical Science, College of Veterinary Medicine, University of Missouri at Columbia. Currently, McAllister is an assistant professor in the College of Veterinary Medicine, Kansas State University, Manhattan, KS.

Moving from the Second Department of Internal Medicine, Nagoya City University Medical School, Nagoya, Japan, **Koichi Miyagawa** is now a research fellow with the Nagoyashi Kohseirin Geriatric Hospital, Nagoya, Japan.

Patricia E. Molina is now affiliated with Brookhaven National Laboratories in Upton, NY, as an associate professor. Molina was previously associated with the Department of Surgery at the State University of New York at Stony Brook.

Alfred L. Nuttall is now affiliated with the Oregon Hearing Research Center in Portland, OR. Previously, Nuttall was with the Department of Otolaryngology, University of Michigan Medical School, Ann Arbor, MI.

Leaving his position as instructor in the Department of General Neurology at the Max Planck Institute of Neurological Research in Cologne, Germany, **Kouichi Ohta** is now an instructor in the Department of Neurology at the Keio University School of Medicine, Tokyo, Japan.

Having accepted a position in the Department of Pharmacokinetics & Metabolism with Genentech, Inc., in South San Francisco, CA, **Nicolas Pelletier** has moved from the Department of Large Animal Clinical Science at Michigan State University, East Lansing, MI.

Paul Pilowsky currently holds a position with the Department of Neurosurgery, Royal North Shore Hospital and Community Health Services, St. Leonards, Australia. Prior to his new position, Pilowsky was a research fellow in the Department of Medicine at the Flinders Medical Centre in South Australia.

Louis Ramazzotto is currently the Director of Research, Hackensack University Medical Center, Hackensack, NJ. Before his new appointment, he was the Director of Research Services, Long Island Jewish Medical Center, New Hyde Park, NY.

Recently, **Florian J. Schweigert**, formerly a professor in the Department of Physiology, University of Leipzig Veterinary Facility, Leipzig, Germany, moved to the University of Potsdam Institute for Nutrition Science in Bergholz-Rehbrücke, Germany.

Moving from the Department of Medicine, Northwestern University, Chicago, IL, **Michael F. Sheets** is now Assistant Professor, Cardiovascular Research Training Institute, University of Utah, Salt Lake City, UT.

Corigan Thetford Smothers has moved from Meharry Medical College's Department of Physiology in Nashville, TN, to the Medical College of Virginia, Department of Pharmacology & Toxicology, Richmond, VA.

Dandan Sun had been associated with the Department of Human Physiology, University of California at Davis. Sun has recently accepted a position as a postgraduate researcher with the Department of Neurological Surgery, University of Wisconsin, Madison, WI.

Deceased Members

Fredric S. Fay	Worcester, MA
Robert Gaunt	Largo, FL
Arnost Kleinzeller	Philadelphia, PA
Carroll J. Martin	Bremerton, WA
F. Harold McCutcheon	Beaufort, NC
Thomas W. Smith	Boston, MA
William Whitehorn	Silver Spring, MD

People and Places

Currently, **Robert D. Toto** is Associate Professor, Department of Internal Medicine, Vanderbilt University, Nashville, TN. Prior to his new assignment, Toto was Associate Professor of Medicine, Department of Internal Medicine, University of Texas Southwestern, Dallas, TX.

Jackson Pui Man Wai has become affiliated with the National College of Physical Education & Sports, Kweisham, Taoyuan, Taiwan. Prior to his new affiliation, Wai was associated with the Department of Sports Science & Physical Education, Chinese University of Hong Kong, Shatin, New Territory, Hong Kong.

Accepting a position as a scientist with the Department of Pharmacology at Berlex Biosciences, Richmond, CA, **Yi-Xin Wang** is no longer an assistant professor, Department of Physiology & Biophysics, University of Tennessee at Memphis.

John G. Widdicombe is no longer affiliated with the Department of Physiology, St. George's Hospital Medical School at Tooting, London, UK. Presently, Widdicombe is Professor and Chairman of UMDS Guy's & St. Thomas's Hospital Campus, Sherrington School of Physiology, London, UK.

Formerly, **Xiaoming Zhou** was affiliated with the Department of Biology at Johns Hopkins University in Baltimore, MD, as a postdoctoral fellow. Now, Zhou is a postdoctoral fellow at the F. Edward Hebert School of Medicine, Uniformed Services Health Sciences Department of Medicine, Bethesda, MD.

Chapter News

New APS Chapter — Wisconsin Physiological Society

At the APS Council meeting in New Orleans, LA, during the Experimental Biology '97 meeting, the APS Chapter Program accepted its third official chapter, the Wisconsin Physiological Society.

The Wisconsin Physiological Society currently is composed of 20 physiologists from around Wisconsin with a diverse research background in both basic and applied physiology. It will be working with other societies being organized in the Midwest to hold an annual

meeting to bring together the greatest number of physiologists in the area.

With the acceptance of the Wisconsin Physiological Society, the APS chapter program now numbers three, including the Iowa and the Ohio Physiological Societies.

The APS Chapter Program is designed to promote interdisciplinary contacts among research workers interested in the physiological sciences and education of the general public, including future physiologists. Chapters of the

Society should represent a given region of the country and must consist of at least 20 regular members. As an incentive to the formation of an APS Chapter, Council has allocated some modest start-up funds and will work with the Chapter to support an APS lecturer at its annual meeting.

APS regular members interested in organizing chapters in their region should contact the APS Executive Director for information and application materials. ♦

Call for Proposals: Inflammation Model Development

The International Program for Animal Alternatives sponsored by the Procter & Gamble Company is committed to the development and validation of new methods that eliminate or reduce the use of animals or the distress imposed on animals. These methods will test the efficacy and safety of drugs or consumer products. Up to three awards will be made for 1998. Maximum award is \$75,000 per year for two years. This program has funded 23 different programs since its inception in 1989.

This year, the International Program for Animal Alternatives is seeking proposals that will lead to the development or validation of methods for the study of inflammation for safety and efficacy testing. Inflammation occurring in the eye, skin, oral mucosa, respiratory tract, gastrointestinal tract, or in connective tissue is of particular interest. Preference will be given to mechanism-based, in vitro, biochemical or cellular methodology that could reduce or eliminate the need for in vivo tests.

The deadline for applications is **August 15, 1997**.

Additional information and application materials may be obtained from the Program Administrator, International Program for Animal Alternatives, Procter & Gamble Company, Miami Valley Laboratories, P. O. Box 538707, Cincinnati, OH 45253-8707. Fax: 513-627-1153; e-mail: ExtResPrgIM@pg.com.

News from Senior Physiologists

Letters to William J. Stekiel

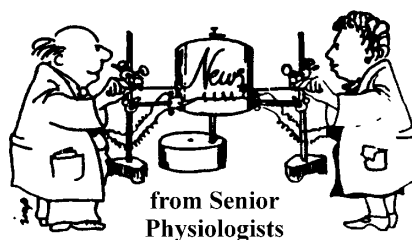
Walter B. Shelley writes: "Your 80th birthday greetings were a welcome reminder of my treasured membership in APS for more than 50 years. My introduction to physiology was working with the great Maurice Visscher and Charles Code at Minnesota. Then came World War II Army research at Fort Knox with Steven Horvath on the effects of high temperatures. After being in Henry Bazett's department at Penn and working in Julius Comroe's laboratory, I carried my sweat gland research over into my career as a dermatologist. Throughout my academic life, physiology has provided the basis for much of my research encompassing the apocrine as well as the eccrine sweat gland, pruritus, hair growth, and the sebaceous gland.

"Although I spent more than 30 years at Penn, I am now Professor of Dermatology at the Medical College of Ohio, where I still practice and do research full time. (At meetings, I have been accosted by individuals who say, "Wasn't it your father who did that first work on cardiac hypertrophy?" in referring to the studies I did with Charlie Code in 1940.)

"I say to young physiologists, your field is the queen of biological thought, whether it be at the organ or at the cell level or whether it be labeled pharmacology or molecular biology. Enjoy it. There is so much more to discover, and as Lord Adrian once whispered to me, "Nothing is impossible." To which I add, even living to be 80."

Dominick P. Purpura writes: "Thank you for your kind remarks and wishes for my 70th birthday. I am still Dean here at the Albert Einstein College of Medicine and more importantly Professor of Neuroscience. I consider the lectures and teaching sessions I give to medical students the highlight of my year!

"For the record, I do not have plans for retirement as yet. Despite the 'heavy burdens' of a deanship, I am enjoying



good health, much happiness, and a relaxed lifestyle. I also sleep like a baby, i.e., awake every two hours and crying a lot at night."

Letter to D. Harold Copp

Leo K. Bustad writes: "I have found your statement 'retirement can be a very busy and rewarding time' to be very true in my life. I am still teaching here and at several other universities on Reverence for Life and the Human/Animal Bond and Animal/Facilitated Therapy. I am President of the Delta Society for the study of the interaction of people, animals, and the environment. We are getting ready now for the greatest meeting on this subject since the Ark."

Letter to Stephen M. Cain

Gerhard Giebisch writes: "Thank you very much for your letter and your kind wishes on the occasion of my 70th birthday. My life so far has not changed at all, and I plan to continue for a while what I have been doing over the last 45 years or so. I still have an active laboratory and plan to apply for grant support in October."

Letters to Robert M. Berne

Robert Alexander writes: "Approaching retirement, I had been awed by the way a few of my senior colleagues were still publishing significant work but also embarrassed by some others who continued to occupy laboratory space to pursue the n th variation of an experiment they had published a decade earlier. I decided

to play it safe, lock my laboratory door behind me, and see what else the world had to offer.

"Fortuitously, I stumbled on a cache of thousands of old documents dating back to 1650, many in Dutch, which had never been translated or analyzed to discover what gems of Albany's early history they might contain. The temptation was too great to pass by; I rolled up my sleeves and went to work. Amazingly, it quickly became apparent that the techniques for researching this type of material had a lot in common with physiological research. As of this date, it has led to seven papers, one full length book, and even a Japanese TV documentary, with more to follow if I live long enough.

"With all due modesty, I find myself developing a worldwide reputation in this esoteric field that exceeds anything earned from my endeavors in physiology. In short, I am working like a fool and having a ball! For recreation, I read *Science* and *The Physiologist* to follow the exciting new developments in the world I left behind me."

Kenneth L. Zierler writes: "Thanks to Claude Pepper, no faculty member whose 65th birthday came after July 1, 1982, could be scrapped on account of age, and thanks to the farsightedness of my parents, my 65th birthday came after July 1, 1982, though only by two months and five days. Consequently, I have enjoyed an additional 15 years of gratifying work. I am still an active full-time faculty member, the oldest and longest in service as a faculty member in the Johns Hopkins University School of Medicine and perhaps in the entire university. But now in my 80th year, I will become emeritus this July 1, 1997.

"For the first 10 years of my life past 65, I continued to run my laboratory, where I worked mainly on effects of insulin on electrical properties of skeletal muscle, finding an insulin effect on five ion channels, and explaining not only the mechanisms of insulin-induced hyperpolarization of mammalian skele-

News from Senior Physiologists

tal muscle but also the mechanism of insulin-induced K^+ net uptake by such muscle. When my NIH grant was not renewed, I had to give up my lab space, but a kind and generous colleague has made it possible for me to resume an experiment that seems to me to be critical in answering the question, "Does insulin increase D-glucose uptake by fat and skeletal muscle cells not only by translocating glucose transporters (GLUT) to the surface membrane but also by increasing the efficiency with which GLUTs transport glucose?" but also to demonstrate the mechanism by which insulin activates GLUT.

"Meanwhile, I have been going over my lab notebooks, which are complete back to the spring of 1946 when I opened my lab at Johns Hopkins. I have been busy writing some "thought" papers based on some of our old results and those of others and also trying to come up with a better, more realistic, less misleading model of total body glucose metabolism and its control.

"Until two years ago, I was active in teaching in the physiology department. My present base is in the Endocrine and Metabolism Division of the Department of Medicine, where I attend rounds, conferences, and journal club and assist in the postdoctoral training program, which puts me in touch with a stimulating group of young physicians who are keen on combining patient care with research, mostly bench research. I also serve on the Medical School Admissions Committee, where I have the enormous pleasure of interviewing what must be as bright and highly motivated a group of young people as one might find anywhere in the world.

"I have too many hobbies. One of them has been cabinet making. I moved my shop to our second home in Martha's Vineyard, where I can enjoy it in the summer months. I work out daily on my NordicTrack, swim daily in the summer, and sailed until two years ago. My wife Margie and I feel young or at most middle-aged. We are still the

greatest ballroom dance couple since Vernon and Irene Castle."

Leonard Share writes: "I am still working, with a reasonably active, grant-supported laboratory. In fact, we are now working hard trying to get these grants renewed. I am also the Primary Investigator for an NIH postdoctoral training grant and a grant that supports a summer cardiovascular research experience for minority students. In addition, I am the President-elect of our Faculty Senate, taking office in May. I undertook this with some reluctance, but this is a critical time for our faculty. I think I can be of help.

"Other less demanding chores include serving on the editorial boards of the *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology* and *News in Physiological Sciences*. I have also agreed to edit a book on *The Endocrinology of the Heart*, part of a series on contemporary endocrinology edited by Michael Conn. I am not quite sure why Michael asked me to do this, but it looks like it will be interesting."

Ernest Page writes: "I still run the freshman medical school course in physiology at the University of Chicago in the Winter quarter, edit the *Handbook of Physiology* on "The Heart" with Harry Fozzard and John Solaro, and do research on my two Public Health Service grants. We have recently discovered that the rat plasma membrane vesicles called caveolae, the most conspicuous ultrastructural features of the heart muscle cell's plasma membrane, are osmometers! They swell in hypertonic solution because they contain water channel proteins: glycosylated CHIP28, otherwise known as aquaporins.

"We have also found that the inside of these caveolae contains the type B atrial natriuretic peptide hormone receptors that bind atrial natriuretic hormones, while on their cytoplasmic surface the caveolae express the guany-

late cyclase activity of the receptor. Besides these, there are lots of other unidentified proteins in our caveolae, so we will not run out of work. But surely that is not of interest to anyone except an old fanatic like me."

John Dorchester writes: "So what do I do with myself? Well, I get up in the morning, sixish, and look out the window. We have a panoramic view of the Gulf Islands, Mount Baker, and the Coast Range of the Cascades. I make myself a cup of tea and watch the dawn break over that scene. I have to pinch myself to make sure that I have not died and gone to heaven! Then, a half hour exercise followed by a three- or four-mile walk, a relaxing jacuzzi, and breakfast.

"Then, it is decision time! Artwork? Finish the painting I am working on? Tennis? Fishing? Salmon in the ocean? Small mouth bass in the lakes and streams? Sailing? Woodworking? Odd jobs around the house? Taking courses in computer science? Or languages (Spanish)? Or doing volunteer work for the Cancer Society? Or just reading? The choices go on and on.

"In our spare time, we travel. We visit all the places we never had the time or the wherewithal to go to before. Since I retired, we have been to England, Scotland, Wales, France, Germany, Spain, Costa Rica, the islands of the Caribbean, Mexico, Hawaii, the islands of the South Pacific, and New Zealand. We have also toured around the US and Canada, still lots to see there. We plan to see some of South America and more of Spain and Portugal in the near future.

"Well, it is almost drink time, so I will close. I will drink to your health and that of all my surviving colleagues, especially those who have ignored the retirement age and continue to toil in the Vineyards. I salute them, but I am too busy doing nothing to join them." ♦

Book Reviews

Current Issues and New Frontiers in Animal Research

Kathryn A. L. Bayne, Molly Greene,
and Ernest D. Prentice (Editors)
Greenbelt, MD: Scientists Center for
Animal Welfare, 1995, 105 pp., index,
\$35.00
LCCN: 95-71537

This book is the proceedings of a conference held in late 1994 and sponsored by the Scientists Center for Animal Welfare (SCAW) and the University of Texas Health Science Center at San Antonio. As scientists who use animals in the conduct of our research, it is incumbent on us to be aware of ethical issues, regulatory requirements, and other issues in their use. This easily readable text covers four broad areas, including regulatory issues, Institutional Animal Care and Use Committees (IACUCs), biosafety issues, and "New Frontiers." Although few of the papers provide much depth, they are good sources for an overview of the topics discussed. Many contain an historical overview and a personal view for future directions.

For those interested in regulatory issues, a USDA representative provides a description of current USDA proposals, including, but not limited to, changes in licensure renewals, implementation of user fees, and the requirement that class B dealers purchase animals only from other licensed dealers or from specified exempt sources. Another paper provides arguments to support the idea that the use of science-based guidelines should be the goal when environmental requirements for animals are determined.

The largest section of the book includes a discussion of IACUC issues. Chapters include a personal discussion of what a good animal use protocol form should and should not include. Another provides an overview of environmental variables that can impact animal usage and an overview of the statistical parameters that should be considered in the design of a typical experiment. One chapter covers topics related to the use of death as an endpoint in experimental studies and includes questions that the IACUC should

consider in the review of such protocols. The author also provides a review of the responsibilities of investigators and animal use staff in these studies.

To provide guidance and aid is how one author describes the reason for an IACUC to develop a code of ethics. Several arguments for and against the development of a code of ethics are presented. As I see it, the number one argument presented for the development of a code of ethics is that it serves to educate — it should contain IACUC policies that are given to new members — and motivate.

One of the most insightful chapters in this section tries to answer the question, "Why should anyone want to be an unaffiliated member of an IACUC?" For those who have served on an IACUC and found the time involved to be more than one could handle in undertaking protocol review, making the semiannual site visits, investigating animal care issues, and training investigators, this chapter provides some food for thought.

The final IACUC issue incorporated in this book describes biotechnology's ethical challenges to IACUCs. A "culturally and politically effective 'ethics of intervention'" is among several ethical challenges to IACUCs the author suggests. In his view, this would help ethically justify biotechnological interventions and would "mitigate the tendency" to instrumentalize nature — to reduce to a mere tool or resource — that is part and parcel of biotechnology.

The next major section of the book covers biocontainment, biosafety, and biohazards. One author discusses the application of enrichment techniques in biocontainment housing conditions as applied to primates. Another describes recombinant DNA technology, gene therapy and viral vectors, and transgenics. Also included is a discussion of viral oncology research and the use of human blood, cells, and tissues.

Another chapter gives an update on the methods of biocontainment. A discussion of physical containment barriers — facilities and architectural features plus engineering features — and management procedures is included. The final two chapters of this section cover the areas of zoonoses, their importance when considering immunocompromised animals, and new directions in the

study of animal behavior. A discussion of newer techniques used in animal behavior is included. Some ethical issues are also presented. The authors argue that facilities need to be more environmentally appropriate and responsive to the needs of the animal. They ask, "Do all lab animals really need to be deprived of dirt, sand, wood, and unprocessed food?" They make an interesting point by using a quote from Duncan and Petherick (1), "Our thesis is that animal welfare is dependent solely on the mental, psychological, and cognitive needs of the animals concerned. In general, if these mental needs are met, they will cover the physical needs."

The final section of the book contains a discussion of "New Frontiers," and, in particular, xenotransplantation. Chapters include the selection of animals for xenotransplantation, a surgeon's view of the field (is it justifiable clinical research or medical adventurism?), and a consideration of the ethics of xenotransplantation — the moral status of species, and the ethical cost/benefit of animals relative to societal values and priorities.

The final chapter of the book discusses the regulatory aspects of using animal models of genetic diseases and treatments. Included is a look at the *NIH Guidelines for Recombinant DNA Research*. (These guidelines, however, have been updated since the publication of this book.)

I recommend this book as a starting point for more in-depth study and discussion about the areas covered. The cost appears reasonable considering that it is not a mass market publication. ♦

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Book Reviews

Calcium Signalling in the Nervous System

P. G. Kostyuk and A. N. Verkhratsky
New York: Wiley, 1996, 206 pp., illus.,
index, \$89.95
ISBN: 0-471-95951-3

The investigation of the fluxes and functions of calcium ions is one of the most prolific and complex topics in modern neurobiology. The amount of information published on this topic is overwhelming, at the very least, to those of us directly involved in the field and must be daunting, at best, to those whose interest is secondary. However, the importance of calcium signaling at any level of physiological interest cannot be disputed. Therefore, an invaluable aid for any physiologist would be a comprehensive overview of calcium fluxes and functions. *Calcium Signalling in the Nervous System*, by P. G. Kostyuk and A. N. Verkhratsky fits the bill nicely.

The organization is very logical and methodical beginning with "Ca²⁺ Influx Through the Plasmalemma" (Chapter 1) proceeding to "Calcium Stores and Release Channels" (Chapter 2), "Temporal and Spatial Organization of Calcium Signal in Nerve Cells" (Chapter 3), "Calcium Signaling in Glial Cells" (Chapter 4) and concluding with "Calcium Signaling in Brain Function" (Chapter 5), which has a final section that includes "Calcium Signaling and Brain Pathology." Each chapter begins with a general overview section that progresses into more detailed sections such that the reader can obtain as much detail as desired on a given chapter topic. Each chapter is comprehensive and complete, and cited literature appears current for the publication date of the book.

The first chapter covers the topic of Ca²⁺ influx through voltage-gated and ligand-gated Ca²⁺ channels. The section on voltage-gated channels is very detailed and covers every aspect from permeation, gating, and subunit composition to pharmacology, modulation, functional diversity, and ontogeny of the different subtypes of voltage-gated Ca²⁺ channels. The section on ligand-operated Ca²⁺ channels is less detailed and considerably shorter but still covers a broad range of topics, including ionotropic glutamate receptors,

nicotinic cholinergic receptors, purinergic receptors, second-messenger activated channels, and Ca²⁺-activated Ca²⁺ channels. The section on nicotinic cholinergic receptors lacks any substantive information about Ca²⁺ signaling and should have been omitted.

Chapter 2 eloquently simplifies the very complex topic of intracellular Ca²⁺ signals originating from intracellular sources. In addition to covering IP₃ and ryanodine-sensitive release sites, as well as their modulation, topics such as Ca²⁺ sequestration and buffering are also addressed. However, the coverage of calcium binding proteins and SERCA pumps is superficial and focuses on molecular structure and homology rather than on function and roles in Ca²⁺ signaling.

Chapter 3 covers perhaps the most difficult aspect of the topic of Ca²⁺ signaling: the spatial and temporal organization of the signal. The authors do a very good job of paying homage to all of the potential components that interact to sculpt these parameters of a signal while maintaining lucidity. The section on CICR signals is a bit lengthy, and some of the information would have been better presented in the preceding chapter. However, this section does precede the sections on the interactions of Ca²⁺ signals from different intracellular sources quite nicely. Calcium binding proteins and SERCAs are covered more fully here and more in the context of players in calcium signaling.

The fourth chapter addresses a topic often overlooked or discounted in neurobiology, the role of glial cells in neural signaling. Glial cells contain all of the same components of calcium signaling as neurons and often generate much more complex calcium signals. Kostyuk and Verkhratsky acknowledge this and cover the entire range of signals in glial cells from influx and release to agonist-induced intracellular Ca²⁺ changes, modulation, and Ca²⁺ waves.

The final chapter attempts to pull all of the information from preceding chapters together into a functional picture of Ca²⁺ signals in brain function. It is a noble attempt, but the authors fall a bit short of this goal. In the section entitled "Functional Role of Low-Voltage-Activated Ca²⁺ Channels," the authors describe mostly roles that LVA do not play and then escape outside the nervous system

for examples of LVA functions. The following sections, "High-Voltage-Activated Ca²⁺ Channels and Transmitter Release," "Control of Synaptic Plasticity," and "Modulation of Neuronal Excitability," are much stronger but are still focused mostly on single-cell function. The final sections, "Neuronal-Glial Interactions," "Modulation of Gene Expression, Cell Differentiation and Programmed Death," "[Ca²⁺]_i Homeostasis and Aging," and "Calcium Signaling and Brain Pathology," place calcium signals more in the context of neuronal systems and networks but shed little light on how calcium signals affect "brain functioning" or higher order tasks such as cognition or perception. Nonetheless, this chapter successfully summarizes the information presented throughout the body of the book and provides the reader with a context in which to place the often detailed and fragmented pieces of a complex puzzle.

The major criticism to be leveled at this book is that the figure captions often lack important information and fail to adequately explain the often complex figures. Overall, though, this is an excellent book, and I heartily recommend it to my fellow physiologists, whether they are directly involved in the investigation of calcium signals or looking for a book to simplify the burgeoning subject of neuronal calcium signaling. ♦

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Book Reviews

Renal Physiology, Second Edition

Bruce M. Koeppen and Bruce A. Stanton
St. Louis, MO: Mosby, 1997, 199 pp.,
illus., index, \$27.95
ISBN 0-8151-5202-7

The first edition of *Renal Physiology* was used by this reviewer as well as other faculty involved in the teaching of basic renal physiology to first-year students at the University of Iowa College of Medicine. The tables, diagrams, and figures made excellent teaching slides.

The second edition of *Renal Physiology* is an improved version of an excellent book for students in biomedical and health sciences. It also serves as a valuable tool for teachers of renal physiology. The book covers most aspects of basic renal physiology, including hemodynamics, transport and regulation of water, and electrolyte and acid-base balance. There are additional chapters summarizing the mechanisms of action of the most commonly used diuretic-natriuretic agents and the renal adaptation to nephron loss. Thus, the book provides a solid background in renal physiology for students' future studies of renal disease in patients.

As in their first edition, the authors have taken great efforts to provide an easily under-

stood book in basic renal physiology. The authors guide students through difficult topics by explaining the concepts step-by-step. In this respect, the chapters on hemodynamics and regulation of potassium and acid-base balance are especially noteworthy for their detailed explanation of the different renal physiological processes. Other chapters may be viewed as being more in a summary format with less explanatory background information, e.g., the chapters covering NaCl and water reabsorption and regulation of effective circulating volume and NaCl balance. However, this is not a serious shortcoming and is likely related to the authors' efforts to provide a book that is as complete as possible in 200 pages.

The book can easily be used for self-study; however, a fundamental knowledge of cellular and cardiovascular physiology is required for a full understanding of some of the concepts discussed. As in the previous edition, the book is supplemented with tables, figures, and diagrams that provide clear illustrations of various concepts. In addition, the appendix contains summary tables of normal clinical laboratory values and transport processes in nephron segments that enable the book to be used as a quick reference guide for students in their future studies.

One difference between the second and first edition of *Renal Physiology* is the addi-

tion of examples of clinical pathophysiology scattered throughout the book in highlighted text boxes. These examples provide a most valuable addition and focus the attention of the student on the relevance of understanding basic physiology for the understanding of clinical pathophysiology. Important concepts are highlighted and repeated for emphasis. As in the first edition of *Renal Physiology*, each chapter ends with a set of questions for students to answer. The correct answers are found in an appendix together with detailed explanations. These explanations serve to both clarify the answers and to supplement the material in the chapters.

A very valuable addition in the second edition of *Renal Physiology* is an appendix with integrative case studies. These self-study clinical cases provide a constructive exercise in clinical problem solving with answers and explanations. The appendix also allows students to self-test their knowledge in basic renal physiology by taking a 50-question multiple-choice test after studying the book. If the student fails the test, the reasons for the failure must be sought beyond the confines of this comprehensive and easy-to-understand introductory overview of basic renal physiology. ♦

Ulla C. Kopp

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Primer on the Autonomic Nervous System

David Robertson, Phillip A. Low, and
Ronald J. Polinsky (Editors)
San Diego, CA: Academic, 1996, 343
pp., illus., index, \$39.95
ISBN: 0-12-589761-8

This primer is a multiauthored book that provides an update and concise synopsis of the autonomic nervous system. The coverage is comprehensive, providing a summary of basic science (anatomy, physiology, and pharmacology) and of clinical medicine. The book will appeal to a wide audience and will be very useful to both basic scientists and clinicians. In very limited space (usually 4-5 pages), each author provides a brief, highly readable summary of the particular scientific

or clinical subject. Each chapter has a limited number (usually 5) of references that are recent (i.e., within the last 3 years). The coverage of the clinical aspects of autonomic nervous disease is particularly useful, since many times medical students and residents need quick information about a particular abnormality that is difficult to obtain in standard textbooks of internal medicine. This monograph serves this need particularly well and since the paperback version is highly portable and relatively inexpensive, this book could easily be "the book" to learn about the mechanisms underlying disease states affecting peripheral and central autonomic functions.

While this is an extremely useful monograph, it has three deficiencies. First, the illustrations in some of the chapters are not very informative. Some have been constructed in a rather crude way using a computer graphics program and have a homemade look. Others

come from the scientific literature but are not particularly didactic for the subject under discussion. Second, almost every paragraph throughout the book has many key (and non-key) terms in bold print. Clearly, some of the scientific terms do not need to be printed in bold type. Third, each chapter is sprinkled with abbreviations that, in some instances, interfere with the ease of access to information. For example, if an abbreviation appears when one jumps into the middle of chapter to obtain some quick information about a disease condition, the reader has to backtrack to the beginning to find its meaning.

In summary, this is an excellent textbook dealing with autonomic functions and will substantially help in teaching this subject. ♦

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Exercise Gas Exchange in Heart Disease

Karlman Wasserman (Editor)

Armonk, NY: Futura, 1996, 311 pp., index, \$65.00

ISBN: 0-87993-629-0

A monograph on the exercise test responses of cardiac patients could be particularly useful to three groups of readers. First, for non-cardiologists doing diagnostic cardiopulmonary exercise testing, there is a need for a book providing detailed information about cardiac exercise pathophysiology, including the issues of arrhythmias and abnormal chronotropic responses, diastolic dysfunction, and peripheral muscle abnormalities. For clinical cardiologists whose expertise is limited to exercise electrocardiography, a text focused on descriptions of exercise protocols, determinants of noncardiac limitations to exercise, and criteria determining a maximal performance would be welcome. Finally, for investigators with more general expertise in exercise pathophysiology, there would be interest in focused reviews on unusual or controversial issues in exercise testing of patients with cardiac disease. Unfortunately only a fraction of the chapters in the multiauthored *Exercise Gas Exchange in Heart Disease* meet the needs of any of those groups. The contributed chapters cover a spectrum of merit ranging from succinct, well-referenced reviews to poorly documented assertions presented at a superficial level. In addition, the overall quality of the book is weakened by a lack of coordination among the chapters.

The editor is the most influential figure in clinical cardiopulmonary exercise testing in the US. Among Wasserman's many accomplishments, he deserves credit for encouraging the cardiology community to undertake gas exchange measurements as part of its exercise testing protocols. The majority of the contributors to this book are cardiologists influenced by his views. Such an assembly of authors represents both a strength and weakness of the book. The strength is that there is a uniformity of investigational protocols and data presentation. Given this common ground among the contributors, it is easy to appreciate the consistency of exercise findings in per-

sons with cardiac disease reported from many different laboratories. The weakness of the choice of authors relates to the interpretation of the data presented. At least 11 of the 20 chapter authors uncritically accept the hypothesis that the appearance of lactate in blood during a progressive exercise test bears a strict causal relationship to tissue hypoxia, and none of the other chapters challenges the concept. This interpretation has become a minority view in the general exercise physiology community (3), but a reader unfamiliar with the issue would have no hint that controversy existed. While one cannot fault an editor for presenting the best case for his views in his own book, the monograph would have been stronger had a representative of the opposition been invited to provide a perspective on the multifactorial explanations for the lactate threshold. A central motivation for exercise studies of persons with cardiac disease is to understand mechanisms responsible for exercise limitation. A monograph with a focus on only one of several hypotheses does not optimally serve that goal.

A number of excellent contributions are included in the monograph. The description of diastolic dysfunction in exercise by M. B. Higginbotham is succinct and clear. The chapter by Sietsema, "Analysis of Gas Exchange Dynamics in Patients with Cardiovascular Disease," describes a number of concepts that all investigators in this field need to understand. The chapter by M. J. Sullivan provides a summary of the intriguing observations supporting the existence of skeletal muscle abnormalities in patients with chronic heart failure. The final "Clinical Applications" section includes an excellent chapter by L. W. Stevenson describing the rationale for the application of exercise testing to select appropriate patients for cardiac transplantation.

The weaknesses in the other chapters come in a variety of different forms. Some of the chapters lack significant information content to merit inclusion, such as the chapter on "Gas Exchange During Recovery from Exercise in Patients with Heart Failure," where the only data (finally) presented are from an abstract by the author. Some of the chapters lack the sophistication of presentation appropriate for this focused monograph. The chap-

ter on "Cardiopulmonary Exercise Testing and the Evaluation of Systolic Dysfunction" by K. T. Weber provides material at a second-year medical student level, includes an incorrect statement about ventilatory limitation to exercise, and cites only five references (all by Weber). Some of the topics chosen, such as exercise testing in preoperative elderly patients or postoperative exercise testing in cardiac surgery patients, are peripheral to the focus of the book and include no significant insights into exercise responses of cardiac patients.

Although the intended audience for the monograph was never explicitly identified in the preface or introduction, there apparently was an intent to introduce exercise testing to readers unfamiliar with the subject. A number of the chapters begin by describing test protocols and equipment at a very basic level. However, due to elisions, repetition, and a general lack of coordination among these chapters, none of them can be recommended as an introduction to gas exchange exercise testing of cardiac patients. These introductory issues are far better covered in current texts, including one written by the editor of this book (2, 6).

A number of redundancies occur among the chapters. As noted above, several of the chapters with an introductory intent discuss analytical equipment, exercise protocols, and interpretation of findings without coordination among the chapters. Four of the five chapters included in the section entitled "The Ventilatory Response to Exercise in Patients with Heart Disease" cover essentially the same material. Of these chapters, the contribution by Metra et al. provides the most sophisticated and complete discussion, while the other chapters provide very little additional material. Another example of redundancy comes with the multiple descriptions of the lactate hypothesis that arise throughout the book. The chapter by Wasserman and Stringer on "Critical Capillary Po_2 , Net Lactate Production, and Oxyhemoglobin Dissociation: Effects on Exercise Gas Exchange" is by far the most complete defense of the hypothesis, and no repetitions are necessary.

The weaker chapters show a lack of sophistication in the interpretation of their progressive work test findings. The authors of

Book Reviews

Chapters 2, 5, 8, 16, and 18 all make reference to the observation that heart failure patients show a reduction in the slope of the relationship between oxygen consumption and power output during a progressive work exercise test. None of the authors of these chapters appears to understand that this finding is not specific to cardiac disease but rather is a finding that can be demonstrated in any individual in a progressive work exercise test if the power output is increased too rapidly relative to the subject's maximal exercise capacity. This point was originally made in a study by Casaburi et al. (1) and is explained in the chapter on the "Analysis of Gas Exchange Dynamics in Patients with Cardiovascular Disease" by Sietsema. The overall quality of the book would have been improved if the authors of the stronger chapters had served as reviewers for the weaker chapters.

Exercise testing is a valuable tool in the diagnosis and care of patients. An objective

assessment of exercise tolerance in patients with heart failure remains one of the most powerful predictors of survival (4). In addition, cardiopulmonary exercise testing in patients with heart disease permits detection of other organ systems limiting exercise performance (6). A book describing both basic issues and the finer details of exercise testing in the cardiac patient would appeal to a large audience. This book cannot be recommended to a reader seeking an introduction to cardiac exercise testing. The established textbooks (2, 6) still represent the best introduction, and the recently published *Handbook of Physiology* (5) represents the best single summary of normal cardiac exercise physiology discussed at the most sophisticated level. While this monograph includes some excellent individual contributions, it does not fully satisfy the need for a monograph addressing the full range of the more advanced aspects of exercise cardiac pathophysiology. ♦

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Life and Death in the Nervous System: Role of Neurotrophic Factors and Their Receptors

C. F. Ibañez, T. Hökfelt, L. Olson, K. Fuxe, H. Jörnvall, and D. Ottoson (Editors)
Wenner-Gren International Series,
Volume 67. Oxford, UK: Pergamon,
1995, 472 pp., illus., index, \$140.00
ISBN: 0-08-042527-5

This book is based on the contributions of the participants to the memorial symposium for Håkan Persson that took place on September 1-2, 1994. Despite my personal, negative predisposition to books of this style, I was pleasantly surprised by this volume, which is far more elaborate than a mere collection of oral presentations. Both the individual contributors and the editors have attempted to put together a one-volume update of the field of neurotrophic factors. This effort is evident throughout most of the text, from the clear synopsis in the preface to the concise view of future directions in neurotrophic factor research and potential clinical applications in the concluding remarks.

The contents and the organization of the book are well thought out. The structure of neurotrophic factors and their receptors along with the features that mediate receptor/ligand interactions are described first, and the mechanisms and pathways of signal transduction are then examined in detail. This sets the stage for a presentation of the role of neurotrophic factors in vitro and in vivo, with separate chapters dealing with development, degeneration and regeneration of the nervous system, control of neurotrophin synthesis and release, and gene knockouts. The information in these chapters was either very recently published or first presented at that symposium.

The overall quality of the publication is very good, with the exception of the incomplete index where, for instance, the word "apoptosis" does not appear. The topic of apoptosis is an example of how the text falls short of a true "chapter book." Even though apoptosis is covered extensively in one contribution, it is mostly overlooked elsewhere. This lack of consistency inevitably stems from the multiplicity of authors and their individual research interests and affiliations. It is particularly difficult in the neurotrophic field to relate experimental results obtained with a specific type of neuron of a given species at a narrow, early embryonic

developmental stage to in vivo experiments in adult animals of a different species. As a result, the relevance of some of the contributions to each other, even within a single chapter, is not always evident. In those instances, the book cannot escape its true nature and reverts to an accumulation of research reports on neurotrophic factors.

Prospective readers should be aware that the subtitle, "Role of Neurotrophic Factors and Their Receptors," is more descriptive than the main title. Most of the book is limited to the structure and function of these molecules. With the exception of CNTF and GDNF, other cytokines with dual function as neurotrophic factors, such as LIF, IGF, FGF, and TGF β , are only occasionally mentioned. The broader role of such cytokines and their potential complementation of the activities of the neurotrophins in the life and death of the nervous system are only peripherally addressed.

Overall, this book offers a concise view of the state of research on neurotrophic factors in late 1994-early 1995. Researchers actively involved in this rapidly expanding field will find this book a solid basis of information on which to build further knowledge. ♦

Nikos Panayotatos
Orangeburg, NY

Books Received

Cardiovascular Physiology, 7th Ed.

Robert M. Berne and Matthew N. Levy.
St. Louis, MO: Mosby-Year Book, Inc.,
1997, 324 pp., illus., index, \$35.95.
ISBN: 0-8151-0901-6.

Cardiopulmonary Physiology in Anesthesiology.

Michael G. Levitzky, Stanley M. Hall, and
Kathleen H. McDonough.
New York: McGraw-Hill, 1996, 322 pp.,
illus., index, \$49.00.
ISBN: 0-07-037534-8.

Computational Biology of the Heart.

A. V. Panfilov and A. V. Holden (Editors).
New York: Wiley, 1997, 416 pp., illus., index,
\$115.00.
ISBN: 0-471-96020-9.

The Developing Heart.

Bohuslav Ost'adal, Makoto Nagamo,
Nobuakira Takeda, and Naranjan S. Dhalla
(Editors).
Philadelphia, PA: Lippincott-Raven, 1997,
544 pp., illus., index, \$125.00.
ISBN: 0-397-58779-1.

MCQs in Basic and Clinical Physiology.

Dom Colbert.
New York: Oxford University Press, 1996,
336 pp., index, \$28.95.
ISBN: 0-19-262736-8.

MCQs in Human Physiology, 5th Ed.

Ian C. Roddie and William F. M. Wallace.
New York: Oxford University Press, 1996,
336 pp., index, \$24.95.
ISBN: 0-340-66234-4.

Molecular Pathogenesis of Diabetes mellitus.

R. D. G. Leslie (Editor).
Frontiers of Hormone Research, Vol 22. A.B.
Grossman (Series Editor).
New York: Karger, 1997, 228 pp., illus.,
index, \$198.25.
ISBN: 3-8055-6373-6.

Mosby's Ace the Boards: Anatomy.

N. Anthony Moore.
St. Louis, MO: Mosby-Year Book, Inc.,
1997, 462 pp., illus., index, \$29.95.
ISBN: 0-8151-6905-1.

*Neurobiology: Ionic Channels, Neurons
and the Brain*.

Vincent Torre and Franco Conti (Editors).
Nato Life Sciences, Vol. 289.
New York: Plenum, 1996, 393 pp., illus.,
index, \$125.00.
ISBN: 0-306-45480-7.

Neurochemistry: A Practical Approach, 2nd Ed.

A. J. Turner and H. S. Bachelard (Editors).
The Practical Approach Series.
D. Rickwood and B. D. Hames (Series Editors).
New York: Oxford University Press, 1997,
302 pp., illus., index, \$60.00.
ISBN: 0-19-963439-4.

The Origins and Consequences of Obesity.

Ciba Foundation Symposium 201.
New York: Wiley, 1996, 278 pp., illus., index,
\$84.95.
ISBN: 0-471-96506-5.

*Possible Health Effects of Exposure to
Residential and Magnetic Fields*.

Washington, DC: National Academy Press,
1997, 356 pp., illus., index, \$39.95.
ISBN: 0-309-05447-8.

*P2 Purinoceptors: Localization, Function
and Transduction Mechanisms*.

Ciba-Foundation Symposium 198.
New York: Wiley, 1996, 337 pp., illus., index,
\$84.95.
ISBN: 0-471-96125-6.

*Tissue Reactions in Response to Hypoxia
and Ischemia*.

J. Grote and C. Stick (Editors).
Stuttgart, Germany: Gustav Fischer Verlag,
1996, 290 pp., illus., index, \$73.53.
ISBN: 3-437-25148-1.

APS Sustaining Associate Members

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SmithKline Beecham Pharmaceuticals
Wyeth-Ayerst Laboratories

Scientific Meetings and Congresses

1997

July 8-12

Symposium on Thermal Physiology, Copenhagen, Denmark. *Information:* Thermal Symposium '97, c/o DIS Congress Service, Herlev Ringvej 2C, DK-2730 Herlev, Denmark. Tel: 45-449-24492; fax: 45-449-25050.

July 17-19

International Potassium Channel Conference, Ulm, Germany. *Information:* Christiane Siemer, Department of Applied Physiology, University of Ulm, Albert Einstein Allee 11, 89081 Ulm, Germany. Tel: 49-731-502-3889; fax: 49-731-502-3260; Internet: <http://www.uni-ulm.de/uni/fak/medizin/grissmer/ipcc/ipcc.htm>.

July 27-August 1

16th International Congress of Nutrition, Montreal, Canada. *Information:* Congress Secretariat, IUNS 97, National Research Council Canada, Building M-19, Montreal Road, Ottawa, ON, Canada K1A 0R6. Tel: 613-993-7271; fax: 613-993-7250.

August 2-4

2nd World Conference of the International Society for Molecular Nutrition and Therapy, Winnipeg, Manitoba, Canada. *Information:* Grant N. Pierce, St. Boniface Hospital Research Centre, 351 Tache Ave., Winnipeg, Manitoba, Canada R2H 2A6. Tel: 204-235-3414; fax: 204-233-6723; e-mail: pierce@sbrc.umanitoba.ca.

August 11-15

Advances in Tissue Engineering, Houston, TX. *Information:* Rice University School of Continuing Studies, 6100 Main Street, Houston, TX 77005-1892. Tel: 713-520-6022; fax: 713-285-5213; e-mail: scs@rice.edu; Internet: <http://www.rice.edu/scs/tissue>.

August 24-29

17th International Congress of Biochemistry and Molecular Biology, San Francisco, CA. *Information:* American Society for Biochemistry and Molecular Biology, 9650 Rockville Pike, Bethesda, MD 20814-3996. Tel: 301-530-7145; fax: 301-571-1824; e-mail: 17iubmb@asbmb.faseb.org; Internet: <http://www.faseb.org/IUBMB>.

September 4-6, 1997

Mechanisms of Secretion: the 51st Annual Meeting and Symposium of the Society of General Physiologists, Woods Hole, MA. *Information:* Society of General Physiologists, P. O. Box 257, Woods Hole, MA 02543-0257. Tel: 508-540-6719; fax: 508-540-0155; e-mail: sgp@mbi.edu.

September 7-10

CAAT-11VTG Symposium on Mechanisms of Toxicity, Baltimore, MD. *Information:* Program Coordinator, Johns Hopkins Medical Institutions, Office of Continuing Medical Education, Turner Building, 720 Rutland Avenue, Baltimore, MD 21205-2195. Tel: 410-955-2959; fax: 410-955-0807; e-mail: cmenet@som.adm.jhu.edu.

September 7-10

10th Annual Congress of the European Society of Intensive Care Medicine, Paris, France. *Information:* Suzanne Smits-De Smet, European Society of Intensive Care Medicine, Congress Secretariat, 40 Avenue Joseph Wybran, B-1070 Brussels. Tel: +32-2-529-58-29; fax: +32-2-527-00-62; e-mail: esicm@pophost.eunet.be.

September 7-10

5th World Congress of the International Society for Adaptive Medicine, Framingham, MA. *Information:* Sonya L. Herrin, Technical Organizer, Science and Technology Corporation, 101 Research Drive, Hampton, VA 23666-1340. Tel: 757-865-7604; fax: 757-865-8721; e-mail: herrin@stcnet.com; Internet: <http://www.stcnet.com/meetings/isam97.html>.

September 7-11

International Congress on Chronobiology, Paris, France. *Information:* Yvan Touitou, Service de Biochimie Medicale, 91 boulevard de l-Hopital, 75634 Paris Cedex 13 France. Tel: 33-01-40-77-96-63; fax: 33-01-40-77-96-65; e-mail: touitou@ccr.jussieu.fr.

September 14-20

First International Congress of the International Society for Autonomic Neuroscience, Cairns, Australia. *Information:* Joel Bornstein, University of Melbourne, Parkville Vic 3052, Australia. Fax: 61-3-9344-5818; e-mail: joel@plexus.physiol.unimelb.edu.au.

September 17-20

AAEM 44th Annual Scientific Meeting and 20th Annual Electrodiagnostic Medicine Continuing Education Courses and Workshops, San Diego, CA. *Information:* AAEM, 21 Second Street SW, Suite 103, Rochester, MN 55902. Tel: 507-288-0100; fax: 507-288-1225; e-mail: aaem@aol.com.

September 19-21

7th Conference on Modeling and Control of Ventilation, Huntsville, Ontario, Canada. *Information:* Betty Bax, Department of Kinesiology, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada. Fax: 519-746-6776; e-mail: bax@healthy.uwaterloo.ca; Internet: <http://www.ahs.uwaterloo.ca/cmvcv>.

September 24-27

Renal Biopsy in Medical Diseases of the Kidney, New York. *Information:* Center for Continuing Education, College of Physicians & Surgeons of Columbia University, 630 West 168th Street, Unit 39, New York, NY 10032. Tel: 212-781-5990; fax: 212-781-6047; e-mail: cme@columbia.edu; Internet: <http://cpmcnet.columbia.edu/dept/cme/>

September 25-28

International Sport Nutrition Conference, Williamsburg, VA. *Information:* Linda Bump, Human Kinetics, 1607 North Market Street, PO Box 5076, Champaign, IL 61825-5076. Tel: 800-747-5547 (extension 2239); fax: 217-351-2674; e-mail: lindab@hkusa.com.

October 2-5

Biomedical Engineering Society 1997 Annual Fall Meeting, San Diego, CA. *Information:* Department of Bioengineering, University of California at San Diego, 9500 Gilman Dr., La Jolla, CA 92093-0412. Tel: 619-822-1997; fax: 619-534-5722; e-mail: bmes97@ucsd.edu; Internet: <http://bmes97.ucsd.edu>.

October 13-16

9th International Conference on Occupational Respiratory Diseases, Kyoto, Japan. *Information:* 9th ICORD Secretariat, c/o Japan Industrial Safety and Health Association, 5-35-1, Shiba, Minato-ku, Tokyo 108, Japan. Tel: +81-3-3452-6841 extension 525 or 526; fax: +81-3-3453-8034.