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Teaching in the Twenty-First Century

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I cannot really express how pleased I was to learn that I had been selected to receive the 1996 Arthur C. Guyton Physiology Teacher of the Year Award. This award is especially meaningful to me for many reasons — not the least of which is that it is conferred by peers who themselves are dedicated and excellent teachers.

The issue that I would like to consider with you focuses on the future of classroom teaching. After reading in *The Physiologist* the remarks of previous winners of this award, I decided that I really could not add very much to their comments on teaching physiology, which they expressed so articulately. So I have chosen a topic that I am very much interested in and one that I hope will provoke some discussion — namely, the future of teaching.

Mark Twain said that, "Predictions are very difficult to make, especially when they deal with the future." I certainly do not claim to have a crystal ball. Nonetheless, it seems clear from my vantage point in California that there will likely be dramatic changes in the way teaching and

learning are delivered in the 21st century. This includes teaching and learning at the prebaccalaureate level as well as in professional schools. In fact, I might go so far as to predict — at least for the sake of argument — that we as teachers, who design our courses and curriculum and who personally interact with our students, are in danger of extinction.

Let me share with you why I have made such a provocative prediction. I would like to begin by describing four factors that, taken together, are driving changes in higher education. Then I'd like to touch on some of the general ways that universities are responding to these factors, and finally, I will conclude with some of my concerns regarding where these responses may be heading.

Factors Driving Change

Resources. As you might imagine, the factor at the top of my list is money — or more precisely, its scarcity. How many of you teach at public institutions? You probably know as well as I do that there is major disinvestment in higher education by the states. For example, over the past four years, the University of California has lost about 25% of its state funds — this year, we have had a brief respite, although no one believes that state funding, relative to total expenditures, will recover any time soon to the levels it was in the 1960s and 1970s. The University of California now

Barbara A. Horwitz received the fourth annual Arthur C. Guyton Physiology Teacher of the Year Award. The following is a speech delivered by Horwitz as she was presented the award at Experimental Biology '96 in Washington, DC in April 1996.

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The Physiologist

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APS Advises House on Random Source Animals

APS provided this testimony to the House Livestock, Dairy, and Poultry Subcommittee Hearing on August 1, 1996, with regard to legislation to eliminate non-purpose-bred animals as a source for research.

This statement reflects the views of the American Physiological Society concerning the importance of random source animals to medical research and education and the need to assure that pets do not inadvertently end up in research labs. The Society wishes to register its concern that if the legislation pending before this Subcommittee were enacted, it would have a devastating effect on physiological research and medical education and further would unnecessarily waste animal lives.

The American Physiological Society is the nation's oldest learned society dedicated to medical research. Founded in 1887, the APS has more than 8,200 members who teach medical students and conduct research at colleges, universities, medical schools, and pharmaceutical and biotechnology companies throughout the US.

Physiologists study how the organs and systems of the body work both when the body is healthy and when it is in a diseased state. Because of the important similarities among living creatures, animals are used as models for the study of certain health problems and to learn more about normal physiological processes. What animal model is selected depends upon what is being studied and how far along the research is. In very basic research, a general similarity between the model and the human or animal disease under study is sufficient. More advanced studies require a model with greater similarities in terms of the structures and functions of its organs. Most research into very basic physiological questions involves rats and mice. Dogs and cats are more likely to be models of choice when research into heart disease, stroke, kid-

ney disease, neurological disorders including spinal cord injury, or respiratory functions starts to show potential for clinical application. Although research involving dogs and cats represents only a very tiny portion — less than 1% — of all animal research performed in this country, it remains vital to future medical discovery.

The number of dogs and cats used in medical research has declined steadily for many years. According to preliminary USDA estimates, in FY 1995 a total of some 90,000 dogs and 30,000 cats were used for medical research, medical and veterinary education, and product testing. In addition to collecting these kinds of annual statistics, the USDA also licenses two categories of animal dealers to sell dogs and cats to research institutions. Class A dealers provide animals that they have bred and raised for research. Class B dealers purchase and resell unwanted animals from municipal pounds and animal control authorities, from other Class B dealers, and from individuals or breeders.

Approximately half the dogs and cats currently needed for research and education are random-source animals. Based upon a survey of its member organizations, the National Association for Biomedical Research (NABR) estimates that as of FY 1995, about 49% of the dogs and 41% of the cats were purpose-bred, mainly by Class A dealers, with a few bred at research institutions. Class B animal dealers provided about 36% of the dogs and 44% of the cats. Pounds provided 13% of dogs and 14% of cats, and the remainder came from private donations and animal shelters.

One important point to understand is that there are differences between the typical purpose-bred or random-source animal that may be significant for some kinds of research. Research animal breeders generally sell small, young

House Panel Hears Testimony on Animal Dealers

USDA came under congressional fire for its enforcement of Animal Welfare Act provisions concerning Class B dealers at an August 1 hearing. The House Agriculture Subcommittee on Livestock, Dairy, and Poultry, chaired by retiring Rep. Steve Gunderson (R-WI), held the hearing to receive testimony on two bills that would severely limit the use of non-purpose-bred dogs and cats in medical research.

Both H.R. 3393, sponsored by Reps. Jon Fox (R-PA) and Tom Lantos (D-CA), and H.R. 3398, sponsored by Reps. Charles Canady (R-FL) and George Brown (D-CA), would eliminate Class B dealers as suppliers of non-purpose-bred animals and would place restrictions and regulatory burdens upon those municipal pounds still willing to provide unwanted dogs and cats for research.

The hearing began with opening statements from Rep. Gunderson, members of the subcommittee, and some of the representatives who sponsored the legislation. Chairman Gunderson sought to strike a balanced tone by noting the need for more information about pet theft and at the same time warning that intimidation or harassment of witnesses would not be tolerated. Reps. Fox, Canady, and Brown made statements about why they believe the legislation is needed to prevent family pets from being stolen for medical research. Subcommittee member Rep. Bob Goodlatte (R-VA) also voiced his support for the legislation. The panel's ranking Democrat, Rep. Harold Volkmer (D-MO), and Reps. Collin Peterson (D-MN) and Cal Dooley (D-CA) chal-

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A Matter of Opinion

St. Petersburg - 1997

St. Petersburg, the “Venice of the North,” waits expectantly for the arrival of the scientific community to participate in the last International Union of Physiological Sciences Congress of this millenium. The nineteenth Century pastel-colored buildings lining the Neva River will serve as the backdrop for the XXXIII International Congress of Physiological Sciences, June 30-July 5, 1997, which will focus on “Integrative Physiology: From Molecules to Humans.” While the city and the organizing committee chaired by Sviatoslav Medvedev are eagerly awaiting the anticipated 4,000 physiologists, there are many who questioned whether the XXXIII Congress would even be held.

In the late 1980s, world politics were considerably different than they are today. The Cold War was beginning to thaw and Mikhail Gorbachev, the leader of the Soviet Union, was attempting to open the USSR to the West through policies of glasnost and perestroika. In response to these changes, APS went to the Soviet Union in 1988 to sign a bilateral exchange agreement with our sister society, Pavlov’s All-Union Physiological Society. At the 1989 IUPS Congress in Helsinki, the General Assembly had a similar opportunity to encourage scientific interactions between the East and West when they received an invitation from the All-Union Physiological Society to hold the 1997 Congress in Leningrad. In a close vote, the General Assembly accepted the invitation to hold the Congress in the Soviet Union.

By the time the IUPS General Assembly reconvened in Glasgow in 1993, there were many individuals who were expressing their concern about the earlier decision to hold the Congress in Leningrad. Communism had been overthrown in Eastern Europe and the former Soviet Union. The guarantees provided for the IUPS Congress by the Soviet Union were no longer valid. Indeed, the USSR and Leningrad no



Church of the Resurrection of Christ.

longer existed at the time of the 1993 IUPS Congress. The General Assembly was faced with the decision as to whether St. Petersburg and Russia would be allowed to be the host city and country for the 1997 Congress. The desire to encourage scientific interactions between East and West seemed even more important because of the elimination of communism. Consequently, the IUPS General Assembly reconfirmed its early decision and accepted the invitation from St. Petersburg, Russia.

In 1993, work began in earnest to ensure that the 1997 IUPS Congress

would be a success. The primary organizer of the Congress, Sviatoslav Medvedev, Director of the Institute of the Human Brain, contracted with CONGREX, a Helsinki-based management company, to help him coordinate site selection, meeting planning, logistics, etc. CONGREX will be responsible for ensuring that the Congress infrastructure is in place and will arrange for lodging and meals for the registrants. So far, they have successfully managed this portion of the meeting. Similarly, an International Program Committee, cochaired by Pavel Simonov (Moscow) and Stanley Schultz (Houston), have organized an outstanding scientific program focusing on the theme, “Integrative Physiology: From Molecules to Humans,” a logical extension of the ideas of the 1993 IUPS Congress. It therefore appears that all the elements for a successful meeting are in place waiting for the arrival of the physiological community.

Despite the organizers’ successful efforts, there are some who remain uncertain about the meeting and St. Petersburg. While the science will no doubt be outstanding, our general unfamiliarity with conditions in Russia and the amenities in St. Petersburg has made some wary.

Recently, my wife and I visited St. Petersburg on the invitation of Dr. Medvedev to see conditions for ourselves so that I might report back to



Peter’s Palace in Petrodvoretz.

A Matter of Opinion

APS members with my observations. I am pleased to tell you that the city is beautiful and the meeting facilities are more than adequate for the 1997 Congress. My wife and I freely traveled through the city on foot and via subway without difficulty and ate at a wide range of restaurants. The key to our visit was a desire to maintain an open mind and to recognize that the facilities are not of the standard that we are used to in the US. Much to our surprise, we discovered that many of the restaurants and hotels are comparable to facilities in the US and other Western countries.

One of the major challenges facing arriving scientists is the small size of the St. Petersburg airport. It is uncertain whether there will be enough flights into St. Petersburg to accommodate the arriving throngs of scientists. Some attendees will have to either take the train or a bus from Helsinki, or might come to the Congress via Moscow. To ensure that you have a seat, I would urge you to purchase a ticket to the Congress as early as possible. APS is prepared to help its members attend the Congress by offering a travel award program with a November 1, 1996, deadline.

Once you leave the airport, you will enter the city via taxi or Congress buses, passing the monotonous gray buildings of the Soviet era. However, you will soon pass from Leningrad into St. Petersburg, going from gray to the pastel shades of green, yellow, and gold that characterize the nineteenth century buildings of the central city. The canals, monuments, museums, and architecturally rich buildings will be what you will experience during the bulk of your visit to St. Petersburg.

The question asked by many is "where should one stay while attending the Congress?" The organizers have made arrangements for a wide array of housing possibilities, ranging from five-star hotels to dormitory rooms. Unfortunately, the five-star



View from a canal in St. Petersburg.

hotel is the Hotel Grand Europe, with single room rates ranging from \$325 to \$475 per night. While it is a beautiful hotel, with excellent restaurants and amenities, it is probably too pricey for most physiologists. It is, however, on Nevsky Prospekt, a street you will find yourself on throughout your visit to St. Petersburg.

There are other more reasonable options for lodging while in St. Petersburg. Further up Nevsky Prospekt, away from the Hermitage Museum and the Neva River, is the Nevsky Palace Hotel, a recently refurbished hotel, with a large number of restaurants. At \$215 per night, their prices are not much different from comparable hotels in major US convention cities (for example, the Grand Hyatt in Washington, DC). Its proximity to the subway station makes it an excellent location for access to the Congress site. In addition, it is only a 20-25 minute walk to the Winter Palace, which houses one of the finest art collections in the world, The State Hermitage Museum.

My wife and I stayed at the Astoria Hotel during our recent visit. Located on the square surrounding St. Isaac's Cathedral, the hotel, with room rates of \$165, has been recently refurbished and offers nice-sized rooms and a pleasant environment. It is in easy walking distance (10 minutes) to the Hermitage and to Nevsky Prospekt. Unfortunately, it is not convenient to a subway station, making it necessary to either take a taxi or a Congress shuttle bus to the Medical-Military Academy, the site of the Congress.

The most convenient hotel to the Congress site is the three-star St. Petersburg Hotel, a large Russian-style hotel with simple, clean rooms at modest prices (\$105 per night). Both the Medical-Military Academy and the St. Petersburg Hotel are close to the "Ploschad Lenina" Metro station and the Finland Railway station, making the site easily accessible from the center of St. Petersburg and for scientists arriving from Helsinki.

There are two other three-star hotels on the Congress list that might be of interest to Congress attendees. The Pribaltiskaja Hotel is a large 1,200-room hotel located on the shores of the Gulf of Finland approximately 6 miles from the Congress site. It is a Russian-style hotel, charging \$125 per night, that appears to be more lively and brighter than the St. Petersburg Hotel. While it is not near Nevsky Prospekt, it can be reached from the "Primorskaya" Metro station near the hotel. Similarly, the Medical-Military Academy can also be reached by using the Congress shuttle buses or by Metro. The other three-star is the Hotel Pulkovskaja 2 (\$105 per night), which is the furthest hotel from the Congress site, approximately 8 miles. It is a typical Russian hotel with small but clean rooms. The hotel is near the "Moskovskaya" Metro station and the Moscow train station, making it readily accessible to scientists arriving by train from Moscow.

For those of you who are more adventurous, the organizers have also arranged for dormitory rooms and several other hotels. Unfortunately, I cannot vouch for these properties, although Dr. Medvedev indicated that they are clean and more than adequate for the attendees.

The Congress will be held at the Medical-Military Academy on the banks of the Neva River in the center of St. Petersburg. Founded in 1798 by Paul I, the son of Catherine the Great, the former Emperor's Medical Surgical Academy provides a campus-like setting with ample space for the various

A Matter of Opinion

lectures, symposia, and workshop. Access to the site will be provided by shuttle buses and by Metro.

While you will be spending most of your time in session rooms during the Congress, the “white nights” will allow you to explore the city in daylight until approximately 2:00 AM. Unfortunately, most of the palaces, museums, and other tourist sites will probably be closed by then. Consequently, I would urge you to spend several extra days in St. Petersburg to visit the Hermitage Museum, St. Isaac’s Cathedral, the Peter and Paul Fortress, the cruiser *Aurora*, and even the Pavlov Museum. If you have the time, you should travel outside the city to visit Petrodvorets — Peter’s Palace. The Palace was built in 1720 after Peter visited Versailles. Its most striking features are its fountains and gold statues. Similarly, attendees should also consider traveling to Pushkin (Detskoe Selo) to visit the bright turquoise and gold Catherine’s Palace.

While the Congress will provide many opportunities for scientific interaction and cultural enrichment, St. Petersburg is not without its problems. Most notable is the water supply, which is contaminated with giardia. Fortunately, most hotels provide bottled water in the rooms and the restaurants use filtered or bottled water. In addition,

bottled water is available in shops and through street vendors. The quality of the food will also vary from one establishment to the next. The hotels will provide you with a large buffet breakfast, which should carry you through much of the day. In addition, the organizers have arranged for Western-style box lunches at the Congress site. While most of the hotels have reasonable restaurants serving both Russian and Western style food, you should also plan on having dinner at one of the many excellent Russian or Georgian restaurants, all of which only accept payment in rubles. Overall, restaurant food prices are comparable to those in most US convention cities.

Unless you are fluent in the Cyrillic alphabet, you might find it difficult to read local signs. However, with patience and the assistance of local residents, you should be able to find the street or subway station that you are looking for.

Probably the one problem that might dissuade you from going to the Congress is the need to pay for your lodging in full by April 30, 1997. There are two reasons for this requirement. The first relates to the popularity of early July for visitors to St. Petersburg. Consequently, early payment guarantees a room for you and ensures that the hotels will not lose potential revenue.

Second, visitors to Russia must obtain a visa, which requires an official invitation letter and a hotel voucher. Because of the need for advance payment and a strict cancellation policy, attendees are strongly urged to take out travel insurance that will also cover costs related to possible cancellation of your trip to the Congress.

Russia is a country in transition, which makes attendance at the XXXIII IUPS Congress even more exciting. The beauty of St. Petersburg and the friendliness of the people will make your visit an enjoyable one. So keep your eyes open for the Final Announcement and Call for Papers, which should be sent to all APS members in October. I hope to see you in St. Petersburg for the last IUPS Congress of the millennium. ♦

Martin Frank

Summary of Important Deadline Dates

November 1, 1996 is the deadline for the APS-sponsored IUPS Travel Award Program.

February 28, 1997 is the deadline for payment of the advanced registration fee, for receipt of abstracts, and for payment of one night hotel deposit.

April 30, 1997 is the deadline for lodging payment.

IUPS Travel Grant Program

The US National Committee for the International Union of Physiological Sciences is seeking applications for travel awards for the XXXIII IUPS Congress in St. Petersburg on June 30–July 5, 1997.

The Committee will screen the applications, and the awards will be made by APS, which is raising funds for the travel. The travel awards will be approximately \$800 to help cover the majority of the airfare to St. Petersburg.

The awards are intended for indi-

viduals who have no other source of funds to attend the Congress. Federal employees are eligible. It is anticipated that more applications will be received than can be funded. To achieve as high a rank as possible, the following factors should be considered:

- Complete all questions on the application.
- Provide copies of letters of invitation if you have been invited to the Congress to make a presentation.
- Provide an indication of participation

in the Congress, including presentations and attendance for most or all sessions.

- Have travel plans that include other professional visits or work.

The deadline for submissions of applications for travel awards is November 1, 1996. The application is on the following page. All applicants must submit **six** copies of the application to USNC/IUPS, National Academy of Sciences, Attn: Robin Schoen, 2101 Constitution Avenue NW, Washington, DC 20418. ♦

Surname _____

XXXIII IUPS Congress Travel Grant Program
St.Petersburg, Russia
June 30-July 5, 1997

Please mail **six** copies of this application to: USNC/IUPS
National Academy of Sciences
ATTN: Robin Schoen
2101 Constitution Avenue, NW
Washington, DC 20418

Deadline: November 1, 1996

1. Name and Degree: _____ Year of highest degree: _____
2. Faculty position or employment title: _____ Year of Birth: _____
3. Address: _____
4. Phone Number: _____ Fax Number: _____
5. Email Address: _____
6. Country of citizenship: _____ Visa status if not US citizen: _____
7. Underrepresented Minority Applicants: Please circle ethnic group to which you belong:
African American Hispanic Native American Pacific Islander
- 8a. Gender: Male Female 8b. Do you need special assistance or accommodations?
9. Attending entire Congress? Yes No If not, which days will you attend?
Will you present an invited paper or poster at the Congress? Yes No
If so, please indicate the sessions you will address. If invited, attach letter of invitation.
Invited to give public lecture (give title): _____

Invited to Congress symposium (give title; indicate chairman): _____
10. Do you intend to submit a poster? (If yes, please give title): _____
11. Please describe your area of specialty (e.g. cell physiology, cardiovascular physiology, neurophysiology, etc.): _____
12. Member of: APS SGP Div .Comp. Physiol. & Biochem., ASZ Soc. Neurosci.
BMES Microcirc. Soc. Other
13. Are you employed by the federal government more than half-time? Yes No
14. Travel: a. City of departure _____ b. Support requested _____
c. Amount of other support available (excluding personal) _____
15. Recent publications (not more than 5 titles, giving full refs). If listing abstracts or manuscripts in press, please indicate.

Surname _____

16. Anticipated abstract (Not more than 250 words on paper or poster you plan to present at the Congress, including names of author and coauthors and indicate presenter. If none, abstract of current work.)

17. Give a brief resume of the scientific purposes and goals of your trip in addition to attending the Congress, including other meetings, satellite symposia, laboratories you plan to visit, work on collaborations, etc.

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(continued from page 267)

receives about one-third of its budget from the state's general fund, an amount that is probably similar to that of universities in many other states, although I believe that the fraction received by the University of Michigan is considerably lower. In fact, James Duderstadt, President of the University of Michigan, has said that "we used to talk about being state-supported, then it was state-assisted, soon it will be state-located." Incredibly, some state legislators in a variety of states (including California) have asserted that their citizens may no longer be able to afford to maintain the quality of education currently provided at their research universities.

Another contributor to the reduced funds available to universities is the reduction in federal research funds. This hits private as well as public universities and affects the scholarly infrastructure of the institution through the loss of indirect costs as well as loss of support for individual faculty members.

Finally, as managed health care spreads across the country, the downsizing that takes place on our general campuses will move into medical schools and allied health programs. This is already happening on many campuses. The potential magnitude of this downsizing is immense, as was recently brought home to me. The National Science Board, which sets policy for NSF and which also advises the President on science policy in general, met at Davis in March 1996. At one of the public sessions I attended, I heard the president of a major university state that his medical school had 1,000 faculty, but in fact, he only needed 55 to deliver the necessary teaching. Now, I don't know how he came up with this number, but I think his intended message is clear. Unless financial considerations improve dramatically, health-related professional schools will have to make major changes in the way they operate. The research enterprise in these schools will not be fully supportable in a cost-containing environment.

Thus, the bottom line is that universities and health centers are being asked to do as much, if not more, with considerably fewer resources, and there is no indication that this pressure for greater productivity will be decreasing in the future.

Inadequately prepared students. A second factor contributing to change is the general failure of K-12 public education, resulting in large numbers of poorly prepared entering students. While the elite private schools may not have to deal with this problem, state universities do — even the best of them. At the University of California, where only the top 12.5% of high school graduates are eligible for admission, about one-third of the regularly admitted freshman must take remedial English. This number has been growing, and although there are attempts to reverse the trend, the success of these attempts is not yet apparent. This leaves universities with several choices. The least expensive (and most political-

NOMINATIONS ARE INVITED FOR THE FIFTH ANNUAL

Arthur C. Guyton Physiology Teacher of the Year Award

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

Each proposed person must be nominated by a member of the American Physiological Society. The nominator is responsible for providing the following application materials and forwarding three copies to the Chairperson of the Award Selection Committee, **postmarked no later than November 30, 1996:**

1. A letter of nomination from the nominator.
2. Letters of support from three other colleagues familiar with the nominee's teaching career, including one from the nominee's chairperson if possible.
3. Letters of support from up to ten current and/or former students.
4. Scores on standard student evaluations of teaching effectiveness.
5. Competitive teaching honors received, such as the Golden Apple.
6. Evidence of educationally-related activities outside the classroom, such as developing laboratory exercises or teaching software; authoring textbooks or educational research articles; education-related presentations at professional meetings; educational committees within the institution; education consultation with other organizations; public appearances, etc.
7. A copy of the nominee's curriculum vitae.
8. Any additional documentation that the nominee wishes to include, such as number of graduate students trained, number of undergraduate students pursuing careers in physiology, teaching innovations introduced, etc.

The person selected will receive the award at the banquet of the Teaching of Physiology Section during the next annual meeting of the American Physiological Society during Experimental Biology '97 in New Orleans, LA, in April 1997. The Arthur C. Guyton Physiology Teacher of the Year will receive a framed, inscribed certificate, an honorarium of \$1,000, and expenses of up to \$750 to attend the meeting. The awardee is requested to write an essay on his/her philosophy of education for publication in *The Physiologist* and is expected to deliver this essay as an address at the annual Section dinner.

SEND NOMINATIONS TO:

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DULUTH, MN 55812
TEL. (218) 726-7905 FAX (218) 726-6181

Teacher of the Year

ly incorrect) choice is to refuse to allow students to matriculate until they make up their deficiencies — most likely through community college courses. A second and the most frequently occurring choice is for universities to offer their own remedial courses. This policy is currently being re-examined on many campuses because of the cost. The third alternative is to lower standards, a choice no one wants.

Increased expectations. We've done a good job in publicizing the fact that college graduates earn more over their lifetimes. While this has stimulated interest in obtaining a college degree, there are adverse consequences of this implicit promise. One is the disillusionment when significant numbers of college graduates have trouble finding jobs, as is the situation today. The other is the blurring in the public's mind over the difference between training and education, a difference that has always been poorly understood. Increased expectations have also come from arguments (supported by considerable data) that this country needs a workforce with high level skills in order to be economically competitive. Thus, expectations are high despite steady-state or decreasing resources.

Need for accessibility. The fourth factor that is driving change in higher education is the pressure for increased accessibility for the growing number of high school graduates. For example, the nine campuses of the University of California (UC) currently enroll approximately 112,000 undergraduates, 25,000 graduate students, and 12,000 health sciences students. Projections are that by 2007 there will be a surge of California high school students, nicknamed "tidal wave II," eligible to enroll at UC. By 2110, the demand may exceed 175,000 undergraduates. While expansion of existing campuses will provide space for some of these students, this expansion will be insufficient to meet the entire need. I sus-

pect this same situation is occurring at many other public institutions.

The net result is more potential students but insufficient funds for mortar and bricks to provide sufficient seats. This translates into a need for either greater productivity or decreased access for students. This in turn challenges us as faculty — *can we increase our productivity without diminishing the quality of education and without imperiling our activities in research and service?*

What Are Universities Doing?

In partial answer to the above question, we can look at how universities are responding to budget constraints. These responses reflect their recognition of the fact that there is little, if any, political leadership urging taxpayer support of higher education. Public universities have accepted the fact that they cannot depend on the state for all of the resources they need. Some of the strategies they are pursuing are conventional; others are more experimental.

Alternate funding sources. Some institutions are moving from public to semi-private status, with increases in fees and tuitions to match — the University of Michigan is the prime example of this. Other state institutions are heavily involved in development activities. For example, at UC Davis, every school and college has a development office for fund raising from corporate, foundation, and individual sources. While these efforts have been remarkably successful, they are unlikely to build the magnitude of the funding base that will be needed in the 21st century.

Partnerships with the private sector. Much of what has happened in this arena has focused on research and development, although schools of engineering have long taken advantage of corporate donations and/or sharing of hardware for training students. This has usually been at the graduate level, but we

are beginning to see initiatives focused on undergraduate education.

Resource sharing with other institutions Resource sharing can take various forms from the sharing of faculty to the sharing of facilities. For example, my own institution has formed regional consortiums in the following ways.

To focus faculty efforts on the essential components of a university education, faculty at UC Davis no longer teach remedial English to freshman. Instead, faculty from local community colleges come to classrooms on the Davis campus to do this teaching.

- Masters students at California State University, Sacramento, can get research experience in laboratories at UC Davis. However, this is usually an informal arrangement between two faculty members.
- Televideo technology is being used to teach courses for students at UC Davis and at other institutions. Usually, for a given course, there is at least one faculty member from each site who contributes. This has worked well, but the facilities and the delivery are expensive because of the requirement for interactive classrooms at the receiving and the delivery sites.

Use of Technology

This latter example leads me to my final topic, the use of technology in education. In many circles — political, industrial, and to some degree university administration — technology is being viewed as a potential savior of higher education, a relatively inexpensive way to reach thousands of students without having to build new campuses or expand the faculty. While I don't consider myself a Luddite, I do believe that there are some danger signs on the horizon. I'd like to consider a few positive and negative aspects regarding technology use in teaching.

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- Clearly, a major positive role for technology is its ability to enrich our courses. Many of us are among the growing number of teachers who use some sort of technology in association with our current classes. This use includes establishing Web pages for our courses, having our students search the Internet for specific information, using computer simulations or other computer programs as an adjunct to our courses, communicating with students via e-mail and newlists — I'm sure that you can add others to this list. In all of these uses, the primary aim is to enhance the *quality* of the course, rather than the productivity of the faculty. In fact, in many cases, productivity is decreased because of the increased amount of time necessary to incorporate these new technologies into courses.

- On the other side of the coin is distance learning. Although not a new idea (I even took a correspondence course when I was an undergraduate), technology is making it more attractive because it can now be more interactive. The use of a mix of teleconferencing, videos, multi-media, and other computer-based approaches is seen as a potential way to increase instructional productivity.

My current interest in distance learning derives from a recent proposal of the governors of the Western States, which I'll come back to in a moment. Until I saw this proposal, I considered distance learning and the concept of the virtual classroom to be marginal enterprises. However, searching the Internet I not only found numerous established distance learning programs but dozens of new initiatives currently underway. All levels of higher education as well as industry appear anxious to jump on this bandwagon. Here I've listed four examples of well-established programs.

- The National Technological Uni-

versity (NTU) is a private, non-profit entity that was established in 1984. It provides courses using instructional television and satellite transmission. The courses originate from faculty in a variety of engineering schools and are beamed primarily to companies. This university offers primarily Masters degrees and is aimed at the working professional.

- New Jersey Institute of Technology uses a mix of on-campus and distance learning for several of their degree programs. Again, their audience is primarily post-baccalaureate.
- University of Phoenix offers 26 different degrees — a mix of Bachelors and Masters degrees related to business and administration, although they also offer a Master of Nursing degree. Their courses are on-line.
- Mind-Extension University (which is part of Jones Intercable, one of the nation's largest cable system operators) provides cable access to a variety of degree and nondegree programs through the MBA degree.

These programs provide access to courses for students who would find it difficult to come to campus, allow students tremendous temporal flexibility, allow expansion to a larger audience without significantly increasing costs, and can be tailored to the different learning modes of various students, although this hasn't been extensively done as yet.

So what is the problem? I see at least three negatives, all emanating from the concept of a university as a community of scholars and a place where students learn to question and reason as well as learning facts.

- The first negative is the loss of classroom interaction. For lecture courses this may be less of a problem in the future as technology improves, but it will continue to be a problem for laboratory, hands-on experiences.

- A second negative is the loss of a campus environment that contributes significantly to intellectual and emotional maturation of undergraduates. While this may be less important for professional (postbaccalaureate) training, I am convinced that there is a significant advantage in interacting with classmates, faculty, and friends at all levels.

- Third on my list is the loss of faculty control of curriculum and standards. This last problem is particularly worrisome. Do I think it can happen? If the recent proposal of the Western Governors Association for a Virtual University is any indication, the answer is an emphatic yes.

In December, 1995, the Western Governors Association met, discussed higher education and technology leadership, and proposed a regional cooperative project using information technology to enable the states to "do better with less." They proposed to establish the Western Virtual University. This was a pet project of the governors of Colorado and Utah, but 11 governors have indicated their intention to "sign on" (representing Arizona, Colorado, Hawaii, Idaho, Montana, Nebraska, New Mexico, North Dakota, Oregon, Utah, Washington, and Wyoming). The timetable is to develop a detailed conceptual design for presentation at their June 1996 meeting and to implement the design by 1997. One of the incentives to push the proposal along is to move before the education establishment — which, according to the governors, includes faculty and accrediting agencies — can muster effective resistance. Currently, the plans are on track. Here are some of the key ideas behind their proposal:

- Western states will be unable to afford the required expansion of higher education.
- The use of electronic instruction will increase productivity by increasing markets — primarily

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lifelong learners, by reforming undergraduate education, by decreasing the duplication of programs across state, and by incorporating the already available and efficient private sector initiatives such as those developed by NTU and Novell.

- The use of an electronic classroom will make teaching learning-centered.
- In this virtual university the faculty will serve as course designers, content specialists, developers of assessment tools, quality control consultants, and academic coaches and tutors.
- Faculty will not provide instruction directly, define the curriculum, or set performance standards.

- However, the private sector will have a major role in designing and accrediting degree and certificate programs and in defining competency.

Questions for the Future

While the above tenets may be appropriate for training and upgrading worker skills, the Western Virtual University is positioning itself for much more than that. It appears to be aiming to serve as a substitute for expanding traditional mortar and brick universities. Can a virtual university provide an environment that will educate individuals to be capable of scholarly analysis — an environment where students are stimulated to ask questions and are guided in

their search for answers? Not easily. Then, how do we as teachers deal with the pressures for increased productivity without abdicating control of the curriculum and direct instruction? How do we maintain an intellectual environment capable of stimulating the exchange of ideas and promoting scholarship? How do we ensure that the university experience does not deteriorate into training and that we are still able to promote scholarship for students from the undergraduate to the graduate level? How do we convince our political leaders that strong financial support for universities is fundamental to the nation's long-term interests? Dealing with these questions are the challenges that we as educators must meet as we move into the twenty first century. ♦

Letter to the Editor

A Response to President Schafer

In response to President Schafer's call to all members of our Society to engage in dialogue about the role of APS and where we are heading (*1*), I wish to state that we must reexamine our goals and restate them realistically. I agree with Schafer in his appreciation of the changes that have taken place in our Society and its activities in the last four years. In particular, the opening up of membership to those who teach physiology in colleges and to others who engage in relevant research outside a university setting is an important achievement. Equally important is the more rational management of the Society's wealth so that funds are being used to encourage young investigators and promote teaching programs in physiology at all educational levels. However, of the four challenges Schafer wants us to address, three are not challenges that are specific to physiologists, they apply

equally to all medical scientists, and I believe we deal with them adequately through our membership in FASEB.

The fourth challenge to train graduate students so that they will become true "integrative biologists," which is the role expected of present-day physiologists, is in the short term totally unrealistic. The definition of physiology as integrative biology, which we all so enthusiastically accepted because of its broad appeal, leads directly to this challenge. However, the type of renaissance person that is needed to be a true "integrative physiologist" is not likely to exist in our country at this time. Such a person would have to have an encyclopedic body of knowledge and critical judgement so acute that he could instantly distinguish new facts discovered at every level of complexity from inaccurate or irrelevant reports and incorporate them into the accepted,

classical body of knowledge. Even if one or two such people are alive in the US today they are not likely to be identified until after they die, nor is it likely that they are members of APS. However, as long as we insist that a physiologist is an integrative biologist, the public, on whose financial support we depend, will ask us to put up or shut up. Claude Lenfant has already done so (*2*).

This is why it is essential that we reexamine the role of physiologists in APS. The American Physiological Society is not only the oldest of the biomedical societies, it has from its very beginning focused its research interests on medical physiology, i.e., the study of the function of the healthy human body as a basis for the study of medicine. Now more than ever it is an understanding of the function of the healthy body that society needs. Recognizing this need, APS has accepted the responsibility

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ity of seeing to it that human physiology be taught at every educational level from kindergarten to college to medical school. However, Schafer suggests that the outreach beyond our own laboratories and graduate students can be an individual matter. He suggests that each APS member spend a day or two a year volunteering to address a community forum in the region he lives in. This will not work. My own experiences in doing just what Schafer suggests a few years ago was that I had the most satisfying teaching experience of my life. However, the flattering response to my presentations lulled me into the illusion that I had done my bit and that I needed to do nothing more. Far more involvement by our Society in all our teaching programs is needed.

Our primary task is to adequately teach our medical students human physiology in such a way that they understand that there is a scientific basis for medical practice. At this time of widespread scientific illiteracy, we cannot leave the teaching of medical science to physicians. The practice of medicine has always been an art, and most of the clinical training of our physicians is a form of apprenticeship. The ability to solve clinical problems by applying the techniques of research scientists and to distinguish between established facts and the generally accepted practices of physicians depends on an understanding of experimental science. In the past the entrance requirements to medical school (the MCAT exams) stressed the importance of physics, math, and chemistry so that students did not need to be taught science in medical school. However, for the last thirty years the importance of scientific literacy for medical freshmen has been progressively de-emphasized, and studies in the humanities gradually became accepted as equivalent to an understanding of physics and chemistry when accepting first-year medical students. Many of the young people who had undergraduate training in the hard

sciences and continued their education became practitioners of the new biomedical sciences. Although many of these scientists are now affiliated with medical schools, almost all of them work at the cellular or subcellular level and are therefore not equipped to teach whole body physiology. As Brian Duling has pointed out (3), there are hierarchies in a complex system such as the human body. Each level in the hierarchy contributes something unique to understanding how the system works, but *it is impossible to understand one level of a systems organization from a lower perspective in the hierarchy*. Thus, to understand how the intact body works, we must study it directly. Such studies coupled with studies of the organ systems and how they interact is the subject matter of classical physiology. Those of us who have done research at this level of complexity are aware of the fact that each experiment that clarifies some problem will also suggest several more that can be answered only by more experimental work at the same or higher level of complexity. I believe that APS must accept the challenge of obtaining financial support for organ systems/whole body physiological research wherever it is carried out, but particularly for physiologists working in medical schools.

An even more pressing problem is one that does not require much financial support. It is the reexamination of the vocabulary we use when discussing our work. I believe that our definitions must be clear and understandable by all literate people. Because of the drastic changes that are occurring in the US health care system, it is inevitable that more and more decisions about the appropriate medical treatment for all Americans will be made by primary care physicians, nurses, pharmacists, and other allied health professionals. All of these must know at least the same basic medical physiology that physicians know. APS is in the pivotal position of (1) coordinating the vocabulary

used in the various disciplines; (2) identifying the core subject matter that all must share, i.e., the established classical physiology; and (3) producing an introductory text or at least a syllabus based on the first two points that all health professionals in the country can use.

In the 1980s several excellent textbooks were published, but the second or third editions of these books that are now being aggressively marketed are heavy tomes suitable, at best, only as reference books for instructors. They all claim to be presenting physiology as integrative biology when, in fact, they simply present a great deal of material from across the entire biomedical spectrum superficially. In general they do not adequately distinguish established facts from speculation, wishful thinking, or promotional statements by scientists. It is for this reason that I believe that APS must undertake the production of a simple authoritative text presenting the core material of our discipline for the use of all students. Such a text should be a paperback, produced entirely in black and white, and with relatively few illustrations. This would make it inexpensive and would enable APS to update it frequently. I believe the need for such a text is so great that its sales would soon repay APS for its initial expenses. ♦

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Edith Rosenberg
Howard University

Council Meets in Snowmass, Colorado

The APS summer Council meeting was held in Snowmass, Colorado, at the Stonebridge Inn on July 10-12, 1996. This summer meeting is highlighted by the Council meeting with a majority of the committee chairs, receiving reports on the committees' accomplishments during the past year, and listening to their plans for the coming year. These committee reports were published in the August issue of *The Physiologist*. In addition, the Council met with L. Gabriel Navar, Chair of the Association of Chairs of Departments of Physiology (ACDP), to finalize the agenda for the joint meeting of APS Council and ACDP in December.

Four items received the most attention from Council: the proposal by President-Elect **Allen Cowley, Jr.**, to sponsor a meeting between geneticists and physiologists to discuss the overlapping future of the two fields; the report of the Long-Range Planning Committee (LRPC) on the future of physiology; the recommendation by the Awards Committee to continue funding of the APS-Genentech Postdoctoral Fellowship; and a proposal to utilize the services of HighWire Press to electronically publish the *Journal of Applied Physiology*.

The Council approved the partial funding of a meeting to be held at the Banbury Center of Cold Spring Harbor Laboratory on "Genomics to Physiology and Beyond: How Do We Get There?" As the Human Genome Project draws to completion in 2005, investigators interested in human biology will be faced with a major challenge, identifying and determining the functions of 100,000 human genes. Geneticists and physiologists working together have a special role to play in this process and this discussion meeting is designed to identify cooperative programs for the mutual benefit of the two disciplines. The ultimate goal of



APS Council. Back (l to r): Richard Traystman, Walter Boron, Heinz Valtin, Gerald DiBona, Francis Belloni, Leonard Johnson. Front (l to r): Celia Sladek, James Schafer, Allen Cowley, Jr., Diana Kunze.

the meeting is the development of a position paper that will help guide our efforts to translate genomics into a better understanding of how biological systems function and thus into clinical application. Council saw this February 1997 meeting as an exciting opportunity to become involved in directing the future of physiology and helping to define its role as an integrative science with other disciplines.

Also of significance was Council's decision to accept the recommendation of the Awards Committee to continue the APS-Genentech Postdoctoral Fellowship even without the support of Genentech. The APS Postdoctoral Fellowship in Mammalian Organ Systems will be advertised shortly. Additional funding for this fellowship will continue to be sought but from more than one company.

The third extremely important action of Council was the enthusiastic acceptance of the LRPC's white paper on the future of physiology. In 1990, the LRPC wrote its first comprehensive report on this subject, and Council felt there was a need in 1996 to review where the discipline of physiology is currently and where it should be headed in the next decade. The Committee

was given the charge at last year's summer Council meeting and has spent the past year gathering input and developing a consensus view. The LRPC presented to Council several recommendations under the categories of education, research, and the role of the APS. The Committee noted that the actions of the Council at this meeting in funding the proposed joint genetics/physiology meeting, holding the joint meeting with the ACDP, and funding the APS Postdoctoral Fellowship are exactly the type of actions the Society should be taking. The finalized LRPC report will be published in the December issue of *The Physiologist*.

The Council also received an update from the APS staff on ongoing efforts to get the *Journal of Applied Physiology* electronically published on the World Wide Web. Council was presented with the revised proposal from OCLC, the original vendor selected, for the electronic publication of the journal as a PDF file. In addition, another proposal was distributed from HighWire Press, the company that is currently putting *Science*, *Journal of Biological Chemistry*, *Proceedings of the National Academy of Sciences*, *Journal of Clinical Investigation*, *Journal of Neuroscience* and others on-line. Council approved the proposal from HighWire Press and instructed staff to work with them to have the *Journal of Applied Physiology* on-line by March 1997 along with several months of back issues.

Of continued interest to Council was a review of the recent Experimental Biology (EB) '96 meeting and the APS programs associated with it and a preview of EB'97. Overall, Council was very pleased with EB'96 and the high level of enthusiasm generated at the meeting because of the various programs. Council was presented with

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the names of the 1997 Distinguished Lecturers and noted that the Distinguished Lectureships are continuing in what has become a tradition of excellence in a very short time. Council was informed that the "hot topic" symposia were very well received at EB'96 and that three slots have been retained for them again this year. The Physiology InFocus Program, although not as well attended as planned for, was deemed a success. The 1997 Physiology InFocus Program is being organized by William Chin and has already been finalized, allowing for much earlier dissemination at various scientific meetings and for inclusion in the Call for Papers for EB'97.

The Society's greater commitment to education at all levels was evident throughout the meeting. The Education Committee's report contained many details related to the various ongoing programs developed by the APS Education Office as well as several new opportunities that exist.



APS Committee Chairs. Back (l to r) Francis Belloni, Richard Traystman, Leonard Johnson, Steven Bealer, Celia Sladek. Front (l to r) Eleanor Ison-Franklin, Andrea Seymour, Shu Chien, D. Neil Granger.

Updates were given on both pending and active grants for the development and dissemination of specialized physiology curriculum for science teachers at the middle and high school levels, the development of a curriculum project titled "My Health, My World" for grades K-4 that is run in conjunction

with Baylor College of Medicine, the development of a summer research training program for high school science teachers, and the development of Local Outreach Teams across the country. The Council approved the Education Committee's recommendation that APS accept the Human Anatomy and Physiology Society's model curriculum for undergraduates.

Council expressed concern over the differences in activity of the twelve sections and discussed ways in which the Society could act to encourage and strengthen sections for greater involvement in Society governance and programming of the spring meeting. Toward this end, Council decided to hold a retreat on sections at the winter Council meeting in 1997.

Additional details of the Council's actions during the June meeting will be communicated to the membership at the next business meeting and in *The Physiologist*. ♦

Schafer Thanks APS Staff

APS President James A. Schafer hosted a staff appreciation luncheon for the 65 employees at the Headquarters Office in Bethesda, Maryland. On behalf of the Council, Schafer thanked the staff for all their efforts over the past year. He noted that because of the dedication of the staff, the Society's programs have continued to be very successful, allowing APS to move in new directions as well as to continue to expand current programs.

A major portion of the staff appreciation reception is the recognition of years of service to the Society. This year, Schafer presented a 30-year certificate to James C. Liakos (Business Manager); 15-year certificates to Linda Allen (Membership Services Manager), Penny Kirby (Business Office), and Jacquelyn Salive (Publications Department); and 10-year certificates to Melinda Lowy (Executive Assistant), Krysia Moore (Journal Copy Editor), and Santa Vadala (Executive Secretary). Schafer expressed Council's appreciation for their many years of service.



(l to r) James Schafer, Melinda Lowy, Penny Kirby, Santa Vadala, Linda Allen, Krysia Moore, James Liakos, Martin Frank.

In addition, Schafer expressed his appreciation for the efforts of all the staff and their hope that the staff would continue in their tradition of excellence for many more years. ♦

Membership

Council Elects Three Honorary Members

At the recent Spring Meeting, APS Council elected three foreign scientists to honorary membership in the Society: Jean-Didier Vincent, Denis Noble, and Francois Morel.

Jean-Didier Vincent is 60 years old. He is a professor at the First Universite de France and at the Faculty of Medicine in Paris, as well as a Director of the Institut Alfred Fessard in the CNRS (Gif/Yvette). He was recently nominated Vice President of the National Council of Programs in the Ministry of Education. From 1979 to 1991, Vincent was director of the Unit of Behavioral Neurobiology in INSERM and a professor at Bordeaux University.

Vincent is a Chevalier de la Legion d'Honneur, Officer of the Palmes Academiques, and a member of several academies, including the US Academy of Arts and Sciences, the Academy Europea, and the Royal Academy of Belgium. He is particularly proud, however, to hold a fisherman's license for the Garonne River.

The scientific contributions of Vincent were made in a recent branch of biology, that of neuroendocrinology, in which he is a world pioneer. This discipline can be summarized as the study of interactions between glands and the nervous system and an approach that the brain is itself an endocrine gland.

The neuroendocrinology concepts developed by Vincent associate hormonal phenomena with behavioral events and the neurophysiological mechanisms underlying them. It is a physiology of the "milieu" in which it is considered that physiology can never be explained by a reductionist approach, but each event should be resituated in a continuity, and in their extracorporated environment, leading to the concept of the "fluctuating state." This concept was developed in a theoretical treatise *The Biology of Emotions*, which has been translated into many languages and widely diffused.



Jean-Didier Vincent

Vincent was among the first to show a modulatory activity for certain hormones on cerebral activity and on the neuronal mechanisms underlying functions such as water and salt balance, hunger, thirst, reproduction, sleep, etc. Casting aside classical barriers between hormones and the nervous system, he showed that certain endocrine cells, including those in the hypophysis, shared with neurons certain properties of electrical excitability. Using molecular electrophysiology techniques and in vitro models (primary cultures and slices of brain and hypophysis), he studied the diversity of regulatory mechanisms and membrane signal transduction, the modulatory action of steroids, and, finally, the way all of these actions are integrated in the adaptive functions of a living organism.

In addition to his accomplishments as a research scientist and teacher, Vincent also communicates through the general media, having recently produced two books: *Casanova ou la Contagion du Plaisir* and *Celui qui parlait presque* (both published by Odile Jacob publishers) along with numerous articles in literary and philosophical journals. In 1993, he had a weekly hour-long program on the radio station France Musique in which he managed to combine music and biology.

Denis Noble is Professor of Cardiovascular Physiology at the University of Oxford, where he directs a large international research team using experimental and computational methods to study cardiac rhythm and arrhythmias. His interest in heart excitation began with his thesis work at University College, London, in 1962 when he discovered the inward rectifier channel and used this experimental work to construct the first model of Purkinje fiber rhythm.

Noble has been honored for his physiological work in many different countries, and in the UK he is a Fellow of the Royal Society and Honorary Fellow of the Royal College of Physicians. He has written and edited many books,



Denis Noble

including *The Initiation of the Heartbeat* (Oxford University Press, 1975; 1979) and *Electric Current Flow in Excitable Cells* with J. J. B. Jack and R. W. Tsien (Oxford University Press, 1975; 1983).

Noble is prominent in several national and international organizations, having been first Secretary and then Foreign Secretary of the Physiological Society of Great Britain and Ireland. As Secretary he was responsible for the celebrations of the centenary of the Society in 1976. He

Membership

was Chairman of the 1993 International Congress of Physiology held in Glasgow when he was editor (with C. A. R. Boyd) of the influential book *The Logic of Life* (Oxford University Press). Since that Congress, he has been Secretary-General of the International Congress of Physiological Sciences (IUPS).

Noble was a founder of the highly effective pressure group Save British Science in 1986 and since then has frequently appeared on radio and television on behalf of scientific research. He has published numerous articles in British and foreign newspapers. He has been involved in discussions with government ministers and opposition leaders on science policy and is now a UK government advisor on scientific relations with East Asia.

Noble's interests include languages (he speaks French fluently and also has knowledge of Japanese and Korean), classical guitar (he owns and plays Rubio and Fischer guitars), philosophy

(in which he has published in professional journals and co-authored a book), and cooking (specialties include French and Indian cuisine). He has also founded two biotechnology companies: Oxsoft, Ltd. and Takhus, Inc.

Francois Morel was born in 1923 and resides in Paris, France. He holds both French and Swiss citizenships. Morel received an MD degree from the University of Geneva and a PhD degree from the University of Paris. Morel was Director of the Laboratoire de Physiologie Cellulaire in Paris from 1968 to 1994 and retired in 1995. He has been a member of the French Academie des Sciences since 1988 and has received many honors and medals, including the Pavlov Medal of the Russian Academy of Sciences, the British-French Medal L.Rapkine, the Volhard Medal der Gesellschaft fur Nephrologie, and honorary membership in the Hungarian Physiological Society.



Francois Morel

In addition, Morel has received awards such as the Lounsberry Award, the Richards Award of the International Society of Nephrology, and the Homer Smith Award and is a Doctor *Honoris Causa* of four universities. ❖

Honorary Members of APS

Ivan Assenmacher
Montpellier, France

Knut Aukland
Bergen, Norway

Emile Baulieu
Paris, France

Michael J. Berridge
Cambridge, UK

Pierre Dejours
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Derek A. Denton
Parkville, Australia

Setsuro Ebashi
Okazaki, Japan

Sir John Eccles
Ticino, Switzerland

Bjorn Folkow
Goteborg, Sweden

Oleg G. Gazenko
Moscow, Russia

Ian Michael Glynn
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Bela Halasz
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Richard D. Keynes
Cambridge, UK

Christopher C. Michel
London, UK

Francois Morel
Paris, France

Erwin Neher
Gottingen, Germany

Denis Noble
Oxford, UK

A.S. Paintal
Delhi, India

Hermann Passow
Frankfurt, Germany

Max F. Perutz
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Johannes Piiper
Goettingen, Germany

Bert Sakmann
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Jens Christian Skou
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Karl J Ullrich
Frankfurt, Germany

Hans H. Ussing
Copenhagen, Denmark

Sir John Vane
London, UK

Jean-Didier Vincent
Paris, France

Ewald R. Weibel
Bern, Switzerland

Silvio Weidmann
Berne, Switzerland

Membership

Election of New Regular Members

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West Virginia University

J. Steven Alexander

Louisiana State University Med. Center

S. Kelly Ambler

University of Chicago

Daniel Stephen Barth

University of Colorado at Boulder

Steven D. Brown

Univ. of Texas Med School-Houston

Kenneth L. Byron

Cardiovascular Institute

Akiva S. Cohen

University of Otago

Charles L. Cox

Stanford University Medical Center

Scott C. Denne

Riley Hospital for Children

Sue P. Duckles

Univ. of California College of Medicine

Steven A. Fisher

University Hospitals

David S. Goldstein

National Institutes of Health

Linda F. Hayward

University of Iowa

Txyh-Chang Hwang

University of Missouri-Columbia

Helen I'Anson

Washington & Lee University

Michael D. Jensen

Mayo Clinic

Magdalena Juhaszova

University of Maryland at Baltimore

Kevin L. Kirk

Univ. of Alabama at Birmingham

Naohiro Koshiya

National Institutes of Health

Gail Koshland

University of Arizona

Jane M. Krauhs

KRUG Life Sciences, Inc.

Djokolngar Maouyo

Johns Hopkins Univ. School of Medicine

Donald Warren Michielli

Brooklyn College

Marilyn L. Moore-Hoon

National Institutes of Health

***Tim R. Nagy**

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Guy Halliday Nelson

Medical College of Virginia

David D. Pascoe

Auburn University

Joyce Marie Richey

University of Michigan

Michael F. Romero

Yale University School of Medicine

***Christopher R. Ross**

Kansas State University

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Loyola University Medical Center

Rick G. Schnellmann

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New York Univ. College of Dentistry

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Georgetown Univ. Medical Center

Peggy McGinnis Simon

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University of Connecticut

John William Swann

Baylor College of Medicine

Janet Scott Van Adelberg

Columbia University

Keith Verner

Pennsylvania State Coll. of Medicine

Nancy L. Wayne

University of California, Los Angeles

***Donald Gordon Welsh**

Yale University

Tony D. Williams

Simon Fraser University

Patricia D. Wilson

Johns Hopkins Univ. School of Medicine

Virginia Wolfenberger

Texas Chiropractic College

Eugene A. Woltering

Louisiana State Univ. Med. Center

* Upgrade from Student

Election of New Corresponding Members

Bruno Bonaz

Pavillon de Neurologie, France

Michael Goodrich Clark

University of Tasmania, Australia

Chantal J Darquenne

Univ of California-San Diego

Bruno Flamion

University of Brussels, Belgium

Eric Grouzmann

Universitaire Vaudois, Switzerland

Jan Henriksson

Karolinska Institutet, Sweden

Mark J. Holness

Queen Mary and Westfield Coll, UK

Per Ole Iversen

Hanson Centre, Australia

Yves Jammes

Faculte de Medecine Montreal, France

Seema Khurana

Johns Hopkins School of Medicine

Yung Kyu Kim

Dongguk University, Korea

Vladimir A. Kulchitsky

Belarus Academy of Science, Belarus

Martin Lavritzen

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Hiroshi Murakami

University of Nebraska

Paul Pilowsky

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Gianfranco Raimondi

University of Di Roma "Tor Vergata", Italy

Erik A. Richter

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Arne Kristian Sandvik

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Toshiyuki Sawaguchi

Hokkaido University, Japan

Hashim Shams

Ruhr-Universitat Bochum, Germany

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Institut fur Pharmakologie, Germany

Pawel J. Szulczyk

The Warshaw Medical School, Poland

Eiji Takahashi

Yamagata University, Japan

Peter Temesvari

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Yale School of Medicine

Xianqun Wang

University of Pennsylvania

Takuya Watanabe

Takeda Chemical Industries LTD., Japan

Jiming Ye

University of Tasmania, Australia

Jie Zhou

Beth Israel Medical Center

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Experimental Biology '97 Preview

April 6-9, 1997 • New Orleans, LA

Milestones in Thermal Physiology

Environmental & Exercise, Comparative, and Central Nervous System Sections and History of Physiology Group

Clark M. Blatteis and Jack A. Boulant

Clark M. Blatteis, Arthur B. DuBois, Jack A. Boulant, Steven M. Horvath, Harold T. Hammel, and Matthew J. Kluger

Progress, it seems, is made in surges in the wake of a seminal discovery or the development of a new technique or a momentous event that creates an urgent need to know. A review of the important advances in thermal physiology research since the beginning of this century indicates that it, too, was spurred on by such milestones. Five in particular stand out. They are: 1) the development by Atwater, Rosa and Benedict of the so-called "respiration calorimeter," which made possible the detailed study of the factors balancing heat production and heat loss and thereby heralded many new discoveries in the field; 2) the extensive and conflicting studies on the central nervous control of body temperature, from Ott in 1884 and continuing to this day, with many issues still unresolved; 3) the applied research conducted for war purposes that provided the framework for the subsequent studies on the basic physiology and pathophysiology of thermoregulation to this date; 4) the tests performed on primitive human populations in their own habitats before and after World War II to analyze the evidence for thermal adaptation; and 5) the almost incredible advances in our understanding of the mechanisms of fever production since Von Liebermeister suggested in 1887 that fever may represent a regulated upward shift of the thermoregulatory set-point.

The early development of calorimetry allowed an in-depth study of the metabolism and heat exchange of the body, the caloric equivalents of fats, proteins and, carbohydrates as well as the effects of exercise, ambient temperature, and other factors on heat exchange. The calorimeter was particularly important in the partitioning of heat loss into radiant, convective, conductive, and evaporative avenues. The introduction of calorimetry to the study and assessment of certain disease states characterized by disordered body temperatures, such as fever, hypo-, and hyperthyroidism, represents an important milestone in thermal physiology.

The basic information regarding heat exchange provided an important stimulus to find the body's thermostat. Many studies involving central lesions and electrical stimulations finally identified the hypothalamus as the important central

modulator. For some years both the anterior (heat loss) and posterior (heat production) portions of the hypothalamus were considered to mediate these different functions. Further, the inputs to the hypothalamus from the peripheral thermal receptors and from the blood were debated as the important elements initiating thermoregulatory responses. These studies and the continuing identification, localization, connectivity, and characterization of thermosensitive neurons and their mediators represent important milestones in thermal physiology research.

The advent of World War II with its virtual global dispersion of U.S. servicemen made obvious the need for much greater understanding of the types and methods of protection against heat, cold and wet environments, and combinations of these. Clo units were established to evaluate the insulative value of various clothing materials. Particularly important were the techniques developed for protecting those living outdoors from the ravages of the environment, thereby contributing to the advancement of the science of clothing as thermal protective wear. Cold injuries and hypothermia, heat illnesses and hyperthermia, indeed the basic physiology and pathophysiology of thermoregulation were studied in detail during World War II, considerably advancing our knowledge of these fields.

Following World War II, a number of investigators undertook a study of the thermal protective techniques used by several unacculturated societies known to wear a minimal amount of clothing throughout the year in Australia and Africa. Comparison of the physiological responses of these subjects to thermal stress with those of acculturated Americans and Europeans provided important information regarding the loss of thermoregulatory ability that has accompanied acculturation. These studies of more than 40 years ago will probably never be extended or repeated because of the rapid acculturation of the groups that were tested.

Finally, these past 20 years in particular have witnessed considerable progress in our understanding of fever, its inducers and their sites and modes of action, the cascade of mediators involved in its modulation, and its putative advantages and disadvantages. It is an on-going story that encompasses all the knowledge reviewed in the preceding topics plus that gained from other disciplines, e.g., immunology and endocrinology. An historical review of this topic in the context of this symposium is most timely.

Thus, the purpose of this symposium is to recapitulate for a new generation of physiologists some of the important steps that have brought us to our present state of knowledge in thermal physiology, indeed in physiology generally. Each of the invited contributors has personal and long-standing

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experience in his topic. It is intended that each speaker will trace for the audience, in about 30 minutes time, the salient, progressive advances in his particular field, right up to the present, and that he will point out as he does so the gaps in our knowledge that still need filling.

Refresher Course for Teaching Respiratory Physiology

APS Education Committee and Teaching of Physiology Section

Stephen E. DiCarlo

Harold I. Modell, Jay P. Farber, and Michael B. Maron

Members of the Education Committee will present a refresher course for teaching Respiratory Physiology. The purpose of this course is to promote the exchange of ideas, materials, and factual information that will facilitate the teaching of Respiratory Physiology. The Education Committee reinstituted refresher courses in Physiology as a part of the annual Experimental Biology meetings in 1996 with a Refresher Course for Teaching Gastrointestinal Physiology. The refresher course is a continuation of efforts to provide yearly updates and teaching strategies for teaching Physiology. The refresher course will take place on Sunday morning and will be comprised of several components-poster presentations, demonstrations (e.g., computer simulations, videos), exhibits (e.g., books, lecture outlines, syllabi, problem-based learning cases), and didactic presentations. Ideas and materials to be presented as posters, demonstrations, and exhibits will be selected from abstracts that will be solicited from the general membership. In addition, materials for presentation will be solicited from publishing houses and from the American Respiratory Association. The didactic component will consist of three 30 minute presentations, each followed by 10 minutes for questions. These presentations will stress innovative approaches for helping students learn Respiratory Physiology.

Pathophysiology of Cardiorenal Systems in Obesity

Water & Electrolyte Homeostasis, Renal, and Cardiovascular Sections

John E. Hall and Allyn L. Mark

Jules Hirsch, David B. West, Alan Shuldiner, John E. Hall, Allyn L. Mark, and Michael W. Brands

Obesity is the most common nutritional disorder in western societies and is a major factor in the etiology of renal and cardiovascular diseases, including hypertension. The development of obesity involves genetic as well as environmental factors and represents a complex syndrome in which multiple control systems are affected that, in turn, impact on cardiovascular regulation. Although the mechanisms that link excessive weight gain with cardiovascular pathophysiology have not been completely elucidated, there have been major advances in our understanding of the genetic, molecular, and integrative changes in cardiovascular, renal, and endocrine function that occur with the development of obesity in experimental animals and in humans. This symposium will focus on the physiologic mechanisms by which obesity alters cardiovascular, renal, and sympathetic function and the consequences of these changes to the pathophysiology of cardiovascular disorders such as hypertension. Topics that will be discussed include genetic abnormalities that can lead to obesity, molecular and cellular alterations in obesity, new models of obesity including genetic and transgenic animal models, and new experimental studies in animals and humans that have elucidated the renal, neurohumoral, and circulatory mechanisms responsible for deranged blood pressure regulation in obesity. Each of the speakers has contributed to our understanding of obesity; equally important, the speakers have examined the link between obesity and cardiovascular pathophysiology from different perspectives using different techniques. Because there has been considerable controversy concerning the mechanisms by which weight gain alters cardiovascular regulation, the goals of this symposium are to integrate new developments from multiple research areas and to outline new directions for future research. Since the symposium will be of considerable interest to a large segment of the American Physiological Society, it was submitted for programming in the Water & Electrolyte Homeostasis Section, the Cardiovascular Section, and the Renal Section.

Vascular Endothelium-Smooth Muscle Communication in the Control of Vascular Function and Growth

Cardiovascular Section and Epithelial Transport Group

Aviv I. Hassid and Dennis B. McNamara

Peter F. Davies, John P. Cooke, Hiroko Nishimura, Dennis B. McNamara, and Paul E. DiCorleto

The blood vessel has the ability to sense changes within its milieu and to integrate these signals by intercellular communication and by local production of mediators. The

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endothelium interacts with hemodynamic factors and blood-borne substances via specific receptor-mediated mechanisms and sends signals via cytokines, nitric oxide, growth factors, and other humoral and physical factors that regulate vascular function and growth. Likewise, vascular smooth muscle (VSM) interacts with the endothelium found with other components of the blood vessels via complex autocrine-paracrine mechanisms to maintain intravascular homeostasis. The aim of the symposium is to discuss the recent advances in understanding the role of the endothelium and VSM unit as a modulator of vascular function and structure, and how an interruption of normal endothelium-VSM communication causes dysfunction of the blood vessel as an interface between the circulation and the tissue and in maintaining vascular tone and transport. Primary questions to be asked include: 1) What is the role of endothelium as a sensor for the hemodynamic forces and blood-borne signals; 2) What is the role of endothelium-derived substances in the signal pathway leading to VSM modulation?; 3) What is the role of VSM in vascular remodeling via autocrine and paracrine mechanisms?; and 4) Does impairment of endothelium-VSM interaction lead to neointima formation and atherogenesis? The symposium will begin with a brief introduction/overview (10 min.) followed by five speakers (25-min. presentation and 5-min. discussion/speaker) on subjects from multidisciplinary aspects integrating molecular/cellular information to the physiology of intact tissues and organisms. The symposium appeals to graduate students, postdoctoral fellows, and established investigators in various disciplines. A brief panel discussion (10-15 min) is scheduled at the end of the symposium to encourage participation from the audience.

Mechanisms of Transport Across the Blood-Brain Barrier

Central Nervous System, Cell & General, Neural Control & Autonomic Regulation Sections and Epithelial Transport Group

Richard A. Hawkins and Susan J. Vannucci

Darryl Peterson, Richard A. Hawkins, John LaTerra, Susan J. Vannucci, Ian A. Simpson, Richard Keep, and Martha O'Donnell

The function of the BBB (blood-brain barrier) is to assure the brain a protected and constant environment. Until recently, the study of the BBB relied on kinetic studies of whole animals or isolated capillaries. These basic studies led to the discovery of several transport systems for essential

metabolites and ions. A problem, however, is that the BBB comprises two membranes, each with very different properties. In the last few years new techniques were developed and applied to the BBB: including molecular biology, specific antibodies that react with known transporters, the ability to isolate, separate and measure transport in the luminal and abluminal membranes, and the development of specific molecules that either bind tenaciously or covalently to transporters. These new methods are rapidly providing a new understanding of the functions of the blood-brain barrier and its mechanism of operation. This is an area of direct relevance to cerebral function in physiological and pathological circumstances.

Recent Insights into the Urinary Concentrating Mechanisms: From cDNA cloning to Modeling Renal Function

Renal Section and Epithelial Transport Group

Matthias A. Hediger and Mark A. Knepper

Dennis Brown, Stephen J. Lolait, Steven C. Hebert, Matthias A. Hediger, and Mark A. Knepper

The goal of this symposium is to review recent insights into the urinary concentrating process and to integrate knowledge obtained from both molecular biological and physiological approaches. In the past few years, there has been considerable progress in cloning proteins which play important roles in urinary concentration. Examples of such proteins are water channels, NaCl transporters, vasopressin receptors, and various ion channels. At present, a challenging task is to take these molecular tools and to apply them to physiologic experiments in order to determine what role these proteins play in urine concentration and water excretions. A significant amount of data is now available on this topic, and the purpose of the present symposium is to review these advances and to discuss in molecular terms how the kidney concentrates urine. To my knowledge a session which focuses on integrative aspects of the molecular biology of transporters and receptors as well as the physiology of the renal urine concentrating mechanism has not yet been held at previous conferences.

The first speaker of this symposium will give a summary on water channels (aquaporins) and discuss recent work on the regulation of these proteins, including insights into membrane trafficking and regulation by end/exocytosis. The second speaker will review the molecular genetics of vasopressin receptors and their involvement in the orchestration of the antidiuretic response. The third speaker will discuss

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the importance of NaK2Cl cotransporters and ROMK potassium channels in establishing and maintaining the corticopapillary osmolality gradient. The fourth speaker will provide an update on the structure, function, and regulation of expression of kidney urea transporters and evaluate their role in the urine concentrating ability. Finally, the fifth speaker will present models describing the urinary concentrating process based on the physiological and molecular data. He will combine all the information presented by the previous speakers and discuss on a molecular level how the kidney concentrates urine.

Regulating Epithelia from their Apical Side: Novel New Mechanisms of Autocrine and Paracrine Signalling

Renal and Respiration Sections and Epithelial Transport Group

Karl Karnaky, Jr.

Karl Karnaky, Jr., Erik Schwiebert, Mark Currie, and Richard Balment

In the traditional view epithelia are regulated by hormones and neurotransmitters acting on receptors located on their basolateral surfaces. In striking contrast a growing literature is documenting mediator regulation of epithelia from their apical surface. At the forefront of this developing area is the realization that the disease implications may be profound. For example, cystic fibrosis can now be viewed in part as a defect in apical membrane signalling events. Several connective tissue cells, which can reach the luminal space by diapedesis, could release apically-acting secretagogues such as histamine, prostaglandin, and 5'-adenosine monophosphate. Over a dozen mediators, including adenosine, atrial natriuretic peptide, c-type natriuretic peptide, angiotensin II, ATP, UTP, bradykinin, endothelin, guanylin, gonadotropin, histamine, parathyroid hormone, prostaglandin D₂, and vasopressin stimulate apically. Functions of apical receptors may include host defense and luminal monitoring, creation of fluid pathways and environments for secreted molecules and cells, feedback regulation, signal amplification in apical membrane microdomains, multifunctionality of a signal mediator, communication up upstream with downstream cells, fine tuning, and, in development, signalling in four dimensions. The key unifying concept is local control. Many, perhaps most, epithelia produce locally-acting mediators and exhibit apical membrane receptors. Significantly, the luminal location of these receptors makes them potential prime targets for pharmacotherapy for various diseases.

Heat Shock Proteins and Myocardial Protection

Cardiovascular and Environment & Exercise Sections and MyoBio (muscle) Group

Rakesh C. Kukreja and James M. Downey

Ivor J. Benjamin, Rakesh C. Kukreja, Wolfgang H. Dillman, Christopher L. Wolfe, Dipak K. Das, and Derek M. Yellon

Myocardial ischemic syndromes cause a major medical problem and a significant economic health care concern. Reperfusion, although used in the clinical arena as essential to the survival of acutely ischemic heart muscle, carries with it the risk of "reperfusion injury." The salvage of additional myocardium is therefore highly desirable. Recent studies show that sublethal ischemia or hyperthermia activate a powerful endogenous protective mechanism, which significantly improves myocardial salvage following prolonged ischemia. Interestingly studies have now shown a direct correlation between the amount of heat shock proteins produced and the degree of myocardial protection following heat shock treatment in experimental animals. A closer examination of this group of proteins and their involvement in cardioprotection during myocardial infarction is extremely important in understanding the myocyte's ability to protect itself against ischemic injury. The purpose of this symposium is to bring together leading experts from all over the world in the field and discuss the current state of knowledge, the controversies in this growing field, and the potential of treating ischemic heart disease with heat shock proteins in the patients.

Molecular and Physiological Regulation of Intracellular Lipid Transport in the Intestine

Cell & General and Gastrointestinal Sections and Members in Industry Group

Charles M. Mansbach and David Hui

David Alpers, David Hui, Arnis Kuksis, John Wetterau, Nicholas Davidson, and Patrick Tso

This symposium will deal with cell biological and molecular biological techniques as they apply to intestinal lipid processing. The absorption, metabolism, and transport of dietary lipids is a complex but major function of enterocytes. Much progress has been made in understanding these processes by

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utilizing technological advances as detailed in the symposium. Gene knockout mice have been used to define the importance of cholesterol esterase in cholesterol absorption. Molecular biological techniques have been used to explore the role of the microsomal triglyceride transport protein in triglyceride transport and in apolipoprotein B editing with respect to the production of the chylomicron-associated edited version of the lipoprotein, apolipoprotein B48. Cell biological techniques have been applied to the study of the movement of triglyceride between intracellular movement of triglycerides. Enzymological studies of triglyceride synthesis have also been investigated.

Challenges Facing Undergraduate, Graduate and Medical Physiology Teachers: Are They the Same?

Teaching Section

Daniel R. Richardson

Shirley A. Whitescarver, David S. Bruce, Barbara A. Horwitz, Philip A. McHale, Allen A. Rovick, Joel A. Michael, Dee U. Silverthorn, Harold I. Modell, and Daniel R. Richardson

One role of a physiology instructor is to create a learning environment in which students can achieve the instructor's expected level of mastery. However, even when students are able to provide appropriate answers to examination questions, suggesting mastery, they may not understand important concepts that form the basis for the instructor's questions. Hence, in reality, the learning environment that appeared to be successful falls short of the desired goal. "Course directors," panelists, and attendees will interact in this forum to address several critical challenges that face physiology instructors of all post-secondary student populations (community college, four-year undergraduate, graduate, professional). These challenges must be recognized if they are to be overcome so that an optimal learning environment can be established.

Glucagon-Like Peptide-1 and the Control of Insulin-Glucose Homeostasis

Endocrinology & Metabolism Section and Members In Industry and Epithelial Transport Groups

Svetlana Mojsov and Erika M. Plisetskaya

Joel F. Habener, Janice C. Parker, Catherine Orskov, Erika M. Plisetskaya, and T.P. Mommsen

The maintenance of steady levels of glucose in response to a meal is controlled by a complex network of metabolic factors. Insulin plays a major role in modulating circulating glucose levels and is part of a feedback loop that keeps both glucose and insulin levels constant in a basal state. In addition to insulin, this network includes such diverse components as amino acids, catecholamines, neurotransmitters, and metabolic hormones. Each of these compounds can influence glucose metabolism by stimulating secretion of insulin from the pancreatic beta cells. Recently, it was discovered that a new peptide secreted in the gut in response to nutrients, called glucagon-like peptide-I (GLP-I), is one of the most potent insulin secretagogues described to date. The amino acid sequence of GLP-I is completely conserved in all mammalian species. Furthermore, the sequence of mammalian GLP-I shows over 60% homology to the sequences of GLP-I's isolated from different species of fish, suggesting that GLP-I plays an important physiological role in lower vertebrates as well.

Clinical studies with GLP-I extended the initial observations and established the unique ability of GLP-I among gastrointestinal peptides to influence the islet cell functions. Administration of GLP-I at physiological doses in healthy human subjects and patients with Type II (non-insulin dependent) diabetes mellitus led to stimulation of insulin secretion and inhibition of glucagon release. Moreover, infusion of GLP-I in patients with Type II diabetes together with a meal eliminated the postprandial rise of circulating glucose levels. These observations served as a basis for the ongoing clinical trials by several pharmaceutical companies which are evaluating the use of GLP-I based therapeutic agents for treatment of imbalance in glucose metabolism manifested in patients with Type II diabetes mellitus. In addition to its pancreatic effect, the most recent studies have implicated GLP-I in the regulation of food intake.

This symposium will integrate clinical and basic research related to different aspects of GLP-I physiology. It is the first instance that such information will be discussed at a Society Meeting in the United States.

Oxygen Sensing Mechanisms in Mammalian Cells

Comparative, Cardiovascular, Environmental & Exercise, and Respiration Sections and Hypoxia Interest Group

Nanduri R. Prabhakar and Sukhumay Lahiri

Franklin H. Bunn, Dana Beitner-Johnson, Xiao-Jian Yuan, Gary E. Gibson, Nanduri R. Prabhakar, and Theresa Burke-Wolin

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Adequate supply of oxygen is essential for the survival of mammalian cells. Hypoxia, i.e., a decrease in oxygen availability, results in acute and long-term physiological consequences and adaptations. Systems response to acute hypoxia include reflexes arising from peripheral chemoreceptors, especially the carotid bodies, as well as direct effects of low oxygen on blood vessels, e.g., pulmonary vasculature. Mechanisms underlying acute effects of hypoxia involve modulation of certain ionic channels and release of specific neurotransmitters. Chronic hypoxia, on the other hand, induces phenotypic remodeling in the basic components of the cardio-respiratory systems involving induction of specific genes. The aim of this symposium is to present current views on how mammalian cells sense oxygen for eliciting acute and chronic effects of hypoxia. Acute effects of hypoxia will be described by Drs. Yuan, Burke-Wolin, Gibson, and Prabhakar, while the talks of Drs. Bunn and Beitner-Johnson will dwell on the long-term effects. Dr. Yuan will describe the role of ion channels in hypoxia-induced pulmonary vasoconstriction and Dr. Burke-Wolin will present on the mechanisms of oxygen-sensing in pulmonary vasculature. How hypoxia affects the release of transmitters will be described by Dr. Gibson. Dr. Prabhakar will describe the newly appreciated roles of nitric oxide and carbon monoxide in carotid body oxygen chemoreception. Drs. Bunn and Beitner-Johnson will describe the possible mechanisms by which hypoxia triggers the expression of different genes that are associated with systems response to low pO_2 . While the focus of Dr. Bunn's talk is on the transcription factors, Dr. Beitner-Johnson will present how calcium and cyclic nucleotide pathways are involved in the gene regulation by hypoxia. Overall, this series of presentations are expected to provide an up-date on the current views on how lack of oxygen being sensed by various mammalian cells to elicit acute as well as phenotypic adaptive responses.

Cellular and Molecular Basis of Capillary Permeability

Cardiovascular, Central Nervous System, and Respiration Sections

Jan E. Schnitzer

James M. Anderson, Fitz-Roy E. Curry, Jan E. Schnitzer, Harold F. Dvorak, and Rakesh K. Jain

This session represents a series of short presentations (followed by questions and discussion) on a number of very new and exciting discoveries illuminating key novel mechanisms responsible for regulating and determining capillary

permeability. The focus is primarily on the endothelium at the cellular and molecular level with emphasis on signaling and binding events occurring at the cell surface and how they influence capillary permeability. This area of investigations over the last decade has blossomed with several important findings contrary to the "old school" dogma about capillary permeability and transport across cellular barriers in general. For instance, through cellular and molecular studies, it has become quite clear that the endothelium is not a passive filter but a dynamic cellular barrier with multiple specific pathways mediating and regulating transcapillary transport. Specific receptors for the transport of select macromolecules across endothelium have been discovered along with transmembrane channel proteins for water transport. Research defining the molecular components of intercellular junctions along with specific modulators that influence the "tightness" of the junctions is progressing rapidly. With the purification of endothelial non-coated plasmalemmal vesicles or caveolae from the plasma membrane has been demonstrated. It is becoming clear that multiple cellular signaling pathways affect not only the assembly and sealing of tight junctions but also the transport via caveolae. Specific regulators of their function in transport have been identified. In disease, physical, cellular, and molecular factors alter transport drastically. Each of the talks brings forth new information and concepts that bring this field into the mainstream of modern biological research and need to be disseminated to all physiologists. The implications for applied research are obvious, especially in the area of drug delivery. This session should be appealing to an audience of diverse interests. It will allow them to assess these advances and provide a clear discussion of the future directions necessary for achieving a more complete understanding of the mechanisms mediating and regulating capillary permeability.

Role of Integrins in Acute Renal Failure

Renal Section and Epithelial Transport Group

Eric E. Simon

John A. McDonald, Lorraine C. Racusen, Michael S. Goligorsky, Marc D. Basson, and Hamid Rabb

The most important class of extracellular matrix, integrins, are important after acute renal injury at several steps. This involvement is a consequence of their interaction with the matrix, their involvement in cell-cell interaction, and because of their signalling role. This symposium will offer a general introduction to the role of integrins in cell function

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via integrin signalling (Dr. McDonald). As a consequence of alterations in integrin-matrix interaction by themselves or secondary to cytoskeletal injury, tubule cells shed in the urine (Dr. Racusen). These shed cells may also interact with cells downstream, resulting in tubule obstruction. Such potential has been shown by both in vitro and in vivo studies. This interaction may be abrogated by RGD peptides (Dr. Goligorsky). After tubule cell shedding, the gap is covered by a combination of cell spreading and cell proliferation. This process is likely similar to repair in other organs such as the gut where in vitro, cell migration has been shown to be integrin-dependent and influenced by cytokines (Dr. Basson). The subsequent proliferation and redifferentiation of tubule epithelial cells is likely also integrin-dependent as these processes are influenced by integrins in other tissues. The role of leukocytes in the process of ischemic acute renal failure has been controversial but recent studies have suggested an important role of leukocyte integrins in acute injury and the potential for abrogation of injury by anti-ICAM (the ligand for leukocyte 2 integrins) antibodies (Dr. Rabb).

The Myocyte Cytoskeleton and Relation to Contractile Protein Synthesis and Function

Cardiovascular Section and MyoBio (muscle) Group

Francis G. Spinale and Thomas K. Borg

James G. Tidball, Allen M. Samarel, Henk Granzier, Kevin P. Campbell, and Francis G. Spinale

The cytoskeleton within muscle plays an integral role in maintaining the myofilament array and other subcellular structures in normal spatial arrangement within the myocyte during the contraction and relaxation process. Ongoing research has demonstrated that the cytoskeleton provides a scaffolding structure for protein assembly and sarcomere formation. Novel cytoskeletal proteins have been identified along the sarcolemma which directly participate in transducing sarcomere shortening into overall cell shortening. This program will present current research findings on how changes in the expression and function of specific myocyte cytoskeletal components can directly influence muscle performance. In addition to state of the art lectures on specific cytoskeletal proteins and contractile protein assembly, this program will integrate these basic studies with pathological processes such as cardiac failure and muscular dystrophy.

Lung Vascular Injury and Remodeling During Development

Respiration and Cardiovascular Sections

Kurt Stenmark and Marlene Rabinovitch

Participants to be announced

Rapid progress continues to be made in our understanding of the mechanisms that control pulmonary vascular development. The purpose of this symposium will be to provide new insights into the cell and molecular mechanisms that contribute to vascular development with the hopes of providing the basis for an understanding of how the immature blood vessel responds to injury. The effect of hemodynamic forces and blood flow on gene and protein expression in the developing vessel will be examined. The role of apoptosis in normal vascular development and in vascular injury will be examined. The role of integrins and other cell surface proteins in normal vascular development will be discussed. The molecular mechanisms regulating the expression of elastin, a crucial protein in vascular development, will be presented. The role of elastases in vascular growth and response to injury will be discussed. Lastly, a specific examination of the changes in vascular wall cell gene expression will be examined in the setting of neonatal lung injury. We believe these will be timely topics and crucial to those who desire a more in depth understanding of how the vasculature of the developing lung responds to injury.

Point-Counterpoint on Environmental and Exercise Physiology Issues

Comparative and Environment & Exercise Physiology Sections and History of Physiology Group

Charles M. Tipton and Carl V. Gisolfi

George A. Brooks, Andrew R. Coggan, Ethan R. Nadel, and Michael N. Sawka

This inaugural session by the EEP Section is to provide a forum for investigators to present contrasting viewpoints on the scientific merit and importance of existing physiological concepts. The intent is to "educate" the audience on the topic, the position of the speakers, and to provide presenters an opportunity to respond to questions from each other as well to interact with those in attendance.

Two topics will be discussed. The first pertains to the significance of the "cross over" concept for glucose utiliza-

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tion by trained populations during progressive exercise. George A. Brooks, the originator of the concept, supports the view that glucose production and utilization by trained population is lower than nontrained subjects during submaximal exercise; but, when the exercise intensity is increased to maximal conditions, the glucose response pattern of the trained subjects is changed so that it “crosses over” the profile obtained from nontrained individuals. However, Andrew R. Coggan has trained subjects which do not show a “cross over” effect. Consequently, this forum will provide them the opportunity to share their data and views with the audience. This portion of the program will be chaired by Charles M. Tipton.

The second topic concerns the relative importance of an expanded plasma volume for heat acclimation and for exercise performance in the heat. Ethan N. Nadel believes that an expanded plasma volume is an essential consideration whereas Michael N. Sawka believes other factors have more importance and significance. Carl V. Gisolfi will serve as chair of this session and moderate the discussion between the speakers and the audience.

Lipid Induced Satiety and the Roles of the Gastrointestinal Tract

Gastrointestinal, Central Nervous System, and Endocrinology & Metabolism Sections

Patrick Tso and Timothy H. Moran

Patrick Tso, Timothy H. Moran, Danielle Greenberg, David A. York, Steven R. Bloom, and Gerard P. Smith

The control of satiety by nutrients has been of great interest to physiologists for decades. In particular, it has been demonstrated in a number of studies that ingestion of fat has a potent inhibitory effect on food intake. Both pre- and post-absorptive mechanisms have been proposed for the inhibitory effects of fat. A number of peptides produced by the enteroendocrine cells as well as the enterocytes which are released in response to intestinal lipid have recently been implicated as playing a role in “satiety” following the ingestion of a meal. These include: cholecystokinin, enterostatin, glucagon-like peptide-1, and apolipoprotein A-IV. However, their potential roles in mediating lipid-induced satiety and whether or how they interact with each other in eliciting this response is not well understood.

The purpose of this symposium is to bring together a group of experts to present the current status of our knowledge of the physiological and biochemical mechanisms for lipid-induced satiety. In addition, the physiological control

of the secretion of these gastrointestinal peptides, their local gastrointestinal effects, and how these may be related to their role as potential “satiety signals” will be discussed. Hopefully, this symposium will also serve as a catalyst for future collaborations between investigators working independently on different aspects of this exciting and important research.

Metabolic Engineering: Regulated Gene Expression to Study Metabolic Regulation

Endocrinology and Metabolism Section

Malcolm Watford and Fatima Bosch

Fatima Bosch, Mike Mueckler, Claudia Evans, and Christopher Newgard

This symposium, Metabolic Engineering, will highlight how controlled expression of key genes in cells and experimental animals has produced exciting new opportunities for the study of metabolic regulation and for the therapy of diseases such as diabetes mellitus. Dr. Bosch will show how overexpression of gluconeogenic enzymes leads to NIDDM and how the regulated expression of other genes may be used to treat this disorder. Dr. Mueckler will focus on the role of tissue-specific glucose transporters in the regulation of whole body glucose homeostasis. The usefulness of specific mutations in enzyme structure to change metabolism will be illustrated by Dr. Evans using the TCA cycle as a model. Dr. Newgard will present work on the engineering of the pancreatic B Cell with the aim of producing surrogate islets for patients with IDDM. The program will demonstrate the significant advances that such techniques have allowed in our understanding whole body glucose metabolism.

Novel Signal Transduction Mechanisms in the Vasculature

Cardiovascular Section

Stephanie W. Watts and Cathy A. Davison

Bradford Berk, Sue Goo Rhee, Kathleen Morgan, R. Clinton Webb, and Mark Nelson

Recent advances have revealed the role of new second messengers in signal transduction. For example, the sphin-

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golipid-derived cerimides have been described as possible second messengers in apoptosis. Very recently, pathways such as these have begun to be investigated in the vasculature. Vascular smooth muscle is involved in multiple disease processes such as hypertension, atherosclerosis, and diabetes. Frequently receptor signal transduction pathways are dramatically altered in these disease states. Thus, understanding of normal signalling pathways is absolutely crucial to determining their role in a disease state. The goal of this symposium is to gather experts in several different fields of signal transduction for the purpose of discussion of these pathways in the vasculature. There is no one signal pathway on which this symposium will focus. Our hope is to present multiple pathways so as to bring researchers "up-to-date" on signalling mechanisms in the vasculature and to foster discussion as to their possible alterations in disease states.

Neurobiology of Temperature Regulation: Role of Stress

Comparative, Environmental & Exercise, and Central Nervous System Sections and Hypoxia Group

Steve Wood and Matt Kluger

Evelyn Satinoff, Matt Kluger, Steve Wood, Christopher Gordon, Larry Crawshaw, Peter Frappell, and Gary Malvin

Both abnormally high and abnormally low body temperatures may become regulated under stressful conditions. This symposium will address the question of why and how body temperature regulation is adjusted. Specifically, what are the interactions between stress and temperature control?

The symposium will be highly integrative, crossing disciplines ranging from cell biology to immunology, neurobiology, and organ systems. Evelyn Satinoff will provide an overview of thermoregulation with emphasis on circadian rhythms. Matt Kluger will describe the role of neuromodulators and messengers in pyrogen-induced fevers. Steve Wood will describe the effect and mechanism of physiological stresses on regulated hypothermia in vertebrates. Chris Gordon and Larry Crawshaw will show how non-disease related stress (toxins and alcohol) cause beneficial reduction of regulated body temperature. Peter Frappell will explain the resetting of set points and physiological controls in the respiratory system. Finally, Gary Malvin will present data at the cellular level, models of temperature control, and suggest directions for future research.

The NO Signal Transduction System in the Lung: From Molecular Biology to Bedside Therapy

Respiration and Cardiovascular Sections

Warren M. Zapol and Kenneth D. Bloch

Kenneth D. Bloch, Paul Huang, Carl F. Nathan, Steven H. Abman, Roger A. Johns, and Lars Gustaffson

The lung matches perfusion to ventilation in order to efficiently exchange respiratory gases both at rest and during exercise. The exact mechanisms responsible for the regulation of vascular and bronchial smooth muscular tone in the adult are incompletely understood.

At birth there is an immediate and marked increase of pulmonary vascular conductance, yet the precise regulation of this vasodilation is unknown. Recently, a novel and potent regulator of smooth muscle tone, the nitric oxide - cyclic guanosine monophosphate signal transduction system, has been discovered. In addition to controlling smooth muscle tone, this system regulates neurotransmission over the NANC system and has immune modulatory functions. Since the lung contains each of the three known isoforms of nitric oxide synthase (NOS) and chemical inhibitors of NOS are not specific, our understanding of the role of each isoform has been incomplete.

The symposium will allow us to discuss advances in our understanding of this important signal transduction system, advances made possible by the recent availability of knockout mice for each of the three major isoforms of NOS. The symposium speakers will also describe studies in animals and humans with long-term respiratory supplementation of inhaled nitric oxide, a novel therapy that permits selective pulmonary vasodilation in adults with ARDS and children suffering from persistent pulmonary hypertension of the newborn and other forms of pulmonary hypertension.

At the end of the session, the audience is expected to have a detailed understanding of some of the key components of the NO-cGMP transduction system, their regulation during fetal development and adult life, the physiological and biochemical effects of stimulating the pathway with exogenous NO in healthy and diseased lungs, and the effects of knocking out each of the isoforms. Finally, the audience should develop an understanding and recognize the profound effects of this key regulatory system on the function of the lung as an efficient gas exchanging apparatus.

Meetings

Mechanisms of Water Flow Across Biological Membranes

Renal, Cell & General, and Water & Electrolyte Homeostasis Sections and Epithelial Transport Group

Mark Lawrence Zeidel and H. William Harris, Jr.

Mark L. Zeidel, Peter Agre, Soren Nielsen, H. William Harris, Mark Knepper, and Carel Van Os

The movement of water across biological membranes is a fundamental process of physiology. Although water is relatively permeable across most membranes, specific barrier epithelia such as those of the distal nephron and bladder maintain apical membranes with exceptionally low water permeabilities. By contrast many cell membranes contain water channels which markedly increase their water permeabilities. The discovery and characterization of the aquaporin water channel proteins has markedly enhanced our understanding of the mechanisms by which water permeates membranes as well as the role of water permeation in several disease states. This symposium will highlight these recent advances: Dr. Zeidel will introduce the symposium and summarize our current understanding of how apical membranes of barrier epithelia are constructed so as to limit water permeability; Dr. Agre will examine how the structure of aquaporins permits them to function as highly selective water pores; Dr. Nielsen will show the localization of the various aquaporins in health and disease, providing inferences as to their role in physiology and pathophysiologic states; Dr. Harris will describe the molecular mechanisms governing trafficking of aquaporin II into and out of the apical membrane of the collecting duct cell; Dr. Knepper will summarize the role of aquaporins in the renal re-absorption of solutes as well as in concentrating and diluting the urine; Dr. Van Os will provide further insights into the structure-function relationships of aquaporin II by examining the effects of mutations in the molecule, which cause the human disease congenital nephrogenic diabetes insipidus, on its function. The symposium will provide a complete update of the molecular biology, physiology, and pathophysiology of water transport across biological membranes.

Guest Societies

Molecular Mechanisms of Cell-Cell Interactions Under Dynamic Flow Conditions

North American Society for Biorheology and APS Epithelial Transport Group

Larry V. McIntire and Julia Meyers Ross

Harry L. Goldsmith, Larry V. McIntire, Michael B. Lawrence, Julia Meyers Ross, and David G. Menter

Over the last ten years it has become increasingly clear that the local mechanical environment can be crucial in determining the molecular mechanisms required for both transient and firm adhesion in cell-cell and cell-surface interactions. This is true for platelets, leukocytes, bacteria, and tumor cells. This symposium will present examples from each of these areas with the goal of providing a state-of-the-art update and developing a unified picture for these interactions. The varying roles of integrins, selectins, and other adhesion receptor family members under different fluid mechanical conditions in both bulk phase and mural adhesion and aggregation will be explored.

Mathematical Approaches to Cellular Engineering

The Biomedical Engineering Society and APS Epithelial Transport Group

David Odde and Daniel Hammer

John Ross, Mark Riley, David Odde, Daniel Hammer, and Richard Dickinson

The goal of this session is to highlight current quantitative approaches being used in conjunction with experiments to understand and control cellular systems. Increasingly the ability to elucidate fundamental mechanisms of cellular behavior and to apply this knowledge for bioengineering purposes requires a wide range of mathematical analysis techniques. Thus, this area represents a critical and expanding foundation of biological and bioengineering research. The

Meetings

papers to be presented in this session address multiple levels of cellular behavior ranging from intracellular transport, reaction, and cytoskeletal dynamics to cell motility and adhesion. Mathematical approaches to be described include deterministic models, probabilistic analysis, and stochastic simulations. Although these will be presented in terms of specific experimental systems, their more general applicability to a wide variety of other systems will also be discussed. The broad selection of biological phenomena represented will also serve to emphasize the potential offered by these types of quantitative approaches. It is anticipated that this session will provide a focal point for discussion between life scientists and bioengineers interested in applying mathematical tools to address fundamental questions in experimental biology and that it will promote the kinds of multidisciplinary efforts increasingly being emphasized in the biological and bioengineering community.

Estrogen Replacement Therapy: Benefits, Risks and Future Outlook

Society for Experimental Biology and Medicine and APS Endocrinology and Metabolism Section

M.T. Ravi Subbiah and Barbara Sherwin

James Liu, Bhagu Bhavnani, Barbara Sherwin, Ravi Subbiah, Barnett Zumoff, Bruce Kessel, and Henry Bryant

The use of estrogen replacement therapy is at an all-time high. Establishment of Women's Health Initiative has generated enormous interest on the effects of estrogen therapy. While these are well documented benefits (heart, cognitive function, and bone), considerable risk (cancer) also exists. Despite the interest it is amazing as to how little is known regarding the benefits of individual estrogens (especially the equine estrogens, present in the most popular brand of conjugated estrogen preparation), their metabolism, and relationship to biological activity. In this symposium pros and cons of estrogen therapy (and potential mechanisms) will be discussed in relation to heart disease, cognitive function, and

cancer. The last topic addresses the future in terms of developing "estrogen of choice." This topic is timely and would generate considerable interest to FASEB '97 attendees.

Cellular Interactions with Tissue Analogs and Biomaterials

The Biomedical Engineering Society and APS Epithelial Transport Group

Prabhas V. Moghe and Francois Berthiaume

Livingston Van de Water, Joachim Kohn, Paul DiMilla, Helen M. Buettner, and Mehmet Toner

The objective of this session is to highlight studies in life sciences and bioengineering that reflect current directions in fundamental tissue engineering and biomaterials research. These studies relate to the analysis, design, and development of tissue analogs and biomaterials which have been inspired by the parallel revolutions in extracellular matrix research in experimental biology. The ultimate applications of tissue and biomaterials engineering are directed toward long-term maintenance of physiological cellular activities in the context of artificial organs/tissues, cell-based therapies (e.g., transplantable bio-artificial tissues and extracorporeal organ-support systems), and superior tissue culture systems. In that direction the central theme of this session is the analysis and control of cellular functions (e.g., anchorage, growth, motility, signaling) via physicochemical changes in cell substrate properties. The spectrum of proposed presentations encompasses a broad range of determinants of cell/tissue function ranging from purely biochemical to the mechanical. Cell-substrate interactions will be primarily considered, although the intriguing means of controlling cell-cell interactions via substrate micropatterning will also be represented. It is anticipated that the session will uniquely stimulate an effective dialogue among the life sciences and bioengineering community and will inspire approaches to engineer cellular responses using novel paradigms. ♦

EB'97 Deadlines

r e m i n d e r

Abstracts:	December 2, 1996
Registration:	February 14, 1997
Housing:	March 6, 1997

Experimental Biology '97

April 6-9, 1997 • New Orleans, LA



1996 HENRY
PICKERING BOWDITCH
AWARD

David H. Wasserman
Vanderbilt University

*The Study of
Glucoregulatory
Mechanisms Using the
Challenge of
Muscular Work*



1996 WALTER B.
CANNON MEMORIAL
AWARD

Ernst Knobil
University of Texas,
Houston

*The Wisdom of the Body
Revisited*

Distinguished Lectureships



ROBERT M. BERNE
DISTINGUISHED
LECTURESHIP OF THE
CARDIOVASCULAR
SECTION

Loring B. Rowell
Univ. of Washington

*Integrated Human
Cardiovascular
Control: Coping With
Small Hearts,
Compliant Vessels,
and Gravity*



HUGH DAVSON
DISTINGUISHED
LECTURESHIP OF THE
CELL AND GENERAL
PHYSIOLOGY SECTION

Erwin Neher
Max Planck Institute
Gottingen, Germany

*A Quantitative
Description of Stimulus-
secretion Coupling in
Adrenal Chromaffin
Cells*



JOSEPH ERLANGER
DISTINGUISHED
LECTURESHIP
OF THE CENTRAL
NERVOUS SYSTEM
SECTION

William Pardridge
University of
California, Los Angeles

*Molecular Regulation of
the Blood-brain Barrier
GLUT1 Glucose
Transporter*



AUGUST KROGH
DISTINGUISHED
LECTURESHIP OF THE
COMPARATIVE
PHYSIOLOGY SECTION

Johannes Piiper
Max Planck Institute for
Experimental Medicine

*Modeling of
Respiratory Gas
Exchange, in the Wake
of August Krogh*



SOLOMON A. BERSON
DISTINGUISHED
LECTURESHIP OF THE
ENDOCRINOLOGY AND
METABOLISM SECTION

C. Ronald Kahn
Joslin Diabetes Center,
Boston

*Intracellular Internet of
Insulin Signaling and its
Alterations in Disease*



EDWARD F. ADOLPH
DISTINGUISHED
LECTURESHIP OF THE
ENVIRONMENTAL
AND EXERCISE
PHYSIOLOGY SECTION

Claus Jessen
Physiologisches Institut

*The Body Core as a
Source of Input Signals
to the Temperature
Regulation System*

Experimental Biology '97

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HORACE DAVENPORT
DISTINGUISHED
LECTURESHIP OF THE
GASTROINTESTINAL
SECTION

John B. Furness
University of Melbourne

*Neural Control of
Digestive Function:
The Intrinsic Circuits*



CARL LUDWIG
DISTINGUISHED
LECTURESHIP OF THE
NEURAL CONTROL AND
AUTONOMIC REGULATION
SECTION

Vernon S. Bishop
University of Texas, San
Antonio

*Baroreflex Regulation:
Effects on Sympathetic
Outflow*



CARL W. GOTTSCHALK
DISTINGUISHED
LECTURESHIP OF THE
RENAL PHYSIOLOGY
SECTION

L. Gabriel Navar
Tulane University

*Integrative Multiple
Paracrine Regulators of
Renal Microvascular
Dynamics*



JULIUS H. COMROE, JR.
DISTINGUISHED
LECTURESHIP
OF THE RESPIRATION
SECTION

Bernard C. Rossier
University of Lausanne

*The Epithelial
Sodium Channel: New
Insights in the Control of
Lung Fluid Clearance*



ERNEST H. STARLING
DISTINGUISHED
LECTURESHIP OF THE
WATER AND
ELECTROLYTE
HOMEOSTASIS
SECTION

Jurgen Schnermann
University of Michigan

*Renal Salt Excretion
and the Juxtaglomerular
Cell Complex*

Meetings

1997 APS Conference

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

October 28 — November 1, 1997 • Park City, UT

ORGANIZERS:

Dale J. Benos

University of Alabama at Birmingham

Bernard C. Rossier

Universit de Lausanne

STEERING COMMITTEE:

Douglas C. Eaton

Emory University School of Medicine

Lawrence G. Palmer

Cornell University Medical College

Bruce Stanton

Dartmouth Medical School

David G. Warnock

Division of Nephrology-UAB

PROGRAM

WEDNESDAY, October 29, 1997

Welcome

Meeting Overview

Dale Benos, Birmingham, AL, and **Bernard Rossier**, Lausanne, Switzerland

Ion Channels: Evolution and History

Ramon Latorre, Santiago, Chile

The ENaC Family

Barbara Grubb, Chapel Hill, NC

Cecilia Canessa, New Haven, CT; **Laurent Schild**, Lausanne, Switzerland; **Peter Snyder**, Iowa City, IA; **Bernard Rossier**, Lausanne, Switzerland; **Edith Hummler**, Lausanne, Switzerland; **Richard Lifton**, New Haven, CT; **Catherine Fuller**, Birmingham, AL.

THURSDAY, October 30, 1997

Na⁺ Channels in the Kidney

James A. Schafer, Birmingham, AL

Larry Palmer, New York; **Brian Ling**, Atlanta, GA; **Nicolette Farman**, Paris, France; **Bruce Stanton**, Hanover, NH; **Matt Breyer**, Nashville, TN; **Steven Ernst**, Ann Arbor, MI.

Regulation of Na⁺ Channels

Dennis Ausiello, Boston, MA

Haim Garty, Rehovet, Israel; **Sarah Sariban Sohraby**, Brussels, Belgium; **Nick Johnson**, Pittsburgh, PA; **Horacio Cantiello**, Boston, MA; **Iskander Ismailov**, Birmingham, AL.

FRIDAY, Friday, October 31, 1997

Socratic Debate: How Does cAMP Regulate Na⁺ Channels?

Dennis Brown, Boston, MA

Francois Verrey, Zurich, Switzerland; **Peter Smith**, Philadelphia, PA.

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

Mortimer Civan, Philadelphia, PA

James Buben, Birmingham, AL; **Doug Eaton**, Atlanta, GA.

Na⁺ Channels in the Lung

Pierre Barker, Chapel Hill, NC

Pascal Barbry, Nice, France; **Hugh O'Brodivich**, Toronto, Canada; **Sadis Matalon**, Birmingham, AL; **Jackson Stutts**, Chapel Hill, NC; **Y. Berthiaume**, Montreal, Canada; **Colleen Talbott**, Chapel Hill, NC; **William Guggino**, Baltimore, MD.

SATURDAY, November 1, 1997

Sensory Transduction and Amiloride-Sensitive Cation Channels

Bernd Lindemann, Homburg, Germany

Carole Hackney, Keele, UK; **Sue Kinnamon**, Ft Collins, CO

Mechanosensitive Ion Channels

Cathy Morris, Ottawa, Canada

Ching Kung, Madison, WI; **Martin Chalfie**, New York; **Monica Driscoll**, Piscataway, NJ; **Mouhamed Awayda**, New Orleans, LA; **Jean-Michel Achard**, Paris, France

Na⁺ Channels and the Cytoskeleton

Fiona McDonald, Iowa City, IA

Adrianna Prat, Boston, MA; **Daniela Rotin**, Toronto, Canada

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

Michael Welsh, Iowa City, IA

David Warnock, Birmingham, AL; **Ric Boucher**, Chapel Hill, NC

Structural Models of Amiloride-Sensitive Na⁺ Channels

Mauricio Montal, San Diego, CA

Tom Kleymann, Philadelphia, PA; **Jean-Daniel Horisberger**, Lausanne, Switzerland; **Robert Guy**, Bethesda, MD.

Meetings

International Joint Meeting of The Sociedad Española de Ciencias Fisiológicas and The American Physiological Society February 4-7, 1997 Hotel Alay of Puerto Marina, Benalmádena, Spain

The International Joint Meeting of The Sociedad Española de Ciencias Fisiológicas (SECF) and APS on February 4-7, 1997 will be held in Benalmádena, in the center of the Costa del Sol. The meeting will be located in the Hotel Alay of Puerto Marina. The joint meeting coincides with the 28th National Congress of the SECF.

Deadlines: Abstracts **October 18, 1996**
Early Registration **October 18, 1996**

PRELIMINARY SCIENTIFIC PROGRAM

TUESDAY, February 4, 1997

Welcome Reception

WEDNESDAY, February 5, 1997

Respiratory Integration

S. González Barón, Málaga, Spain; M.S. Dawid Milner, Málaga, Spain; A.I. Pack, Philadelphia, PA.

Physiological and Nutritional Aspects of Aging

J. Mataix, Granada, Spain; S. DiMauro, New York.

Mapping the Cerebral Cortex of Man with PET and FMRI
Plenary Lecture by P. Roland, Stockholm, Sweden.

Central Cardiovascular Control

J.A. Narváez, Málaga, Spain; J.P. Lara, Málaga, Spain; C.M. Ferrario, Winston-Salem, NC.

Body-Brain Temperature: New Perspectives

F. Mora, Madrid, Spain; C.V. Gisolfi, Iowa City, IA.

THURSDAY, February 6, 1997

Endothelial Control of Renal Function

J.P. Granger, Jackson, MS; J. Salazar, Murcia, Spain.

Actions of Hormones and Endocrine Peptides on the Central Nervous System

J. Bernal, Madrid, Spain; L. de Lecea, La Jolla, CA.

Varied Regulation of Salt Reabsorption by the Collecting Duct
Plenary Lecture by J.A. Schafer, Birmingham, AL.

Mathematical Modeling of Physiological Systems

L. Roa, Sevilla, Spain; L.G. Navar, New Orleans, LA.

Plasticity and Regeneration in the Central Nervous System of Adult Mammals

J.M. Delgado, Sevilla, Spain; D.L. Alkon, Bethesda, MD.

Melatonin: An Endogenous Cell Protector

D. Acuña, Granada, Spain; R.J. Reiter, San Antonio, TX.

General Meeting of the "Sociedad Española de Ciencias Fisiológicas"

FRIDAY, February 7, 1997

Epithelial Membrane Transport

A. Ilundain, Sevilla, Spain; J. Bolufer, Sevilla, Spain; P.S. Aronson, New Haven, CT.

Homeostatic Drives During Exercise

E.R. Nadel, New Haven, CT; V.J. Fernández Pastor, Málaga, Spain.

Renal Physiopathology and Diabetes

A. Palma, Sevilla, Spain; J.M. González Molina, Málaga, Spain.

Physiological Breakthroughs: Past Limitations and Present Possibilities

Plenary lecture by K. Schmidt Nielsen, Durham, NC.

Teaching of Physiology in Spain

R. Alonso, Tenerife, Spain; A. Morales, Alicante, Spain.

For a complete meeting program, contact:

International Joint Meeting of SECF-APS
Dr. Martin Frank, Executive Director
American Physiological Society
9650 Rockville Pike
Bethesda, MD 20814-3991
301-530-7118
301-571-8305 (fax)



Plan Now to Attend!

The American Physiological Society
Physiology InFocus

CELL SIGNALING: MULTIPLE PATHWAYS, INTEGRATION AND CROSSTALK

at
Experimental Biology '97
April 6-9, 1997, New Orleans, LA

Organizer: William W. Chin, Harvard Medical School, Boston

Sunday, P.M.

Molecular Physiology of Obesity

Chairs: Jeffrey M. Friedman, Rockefeller University, New York

Leonard S. Jefferson, Pennsylvania State University, Hershey

Monday, A.M.

Integration of Signal Transduction in Hormone Action via Nuclear Receptors

Chair: Benita S. Katzenellenbogen, University of Illinois, Urbana

Monday, P.M.

Growth Factors, Receptors and Crosstalk

Chair: C. Ronald Kahn, Harvard Medical School, Boston

Tuesday, A.M.

Nuclear Receptors, Crosstalk and the Brain

Chair: Donald W. Pfaff, Rockefeller University, New York

Wednesday, A.M.

Thyroid and Steroid Hormones in Non-Genomic Action

Chair: Jack L. Leonard, University of Massachusetts School of Medicine, Worcester

Submission of volunteered abstracts encouraged -
Abstract Deadline: Monday, December 2, 1996

For additional information, contact:
Experimental Biology '97 Meeting Office
9650 Rockville Pike, Bethesda, MD 20814
Tel:301-530-7010 FAX:301-530-7014
E-Mail:eb@ns1.faseb.org

Meetings

1996 APS Conference Report

pHysiology of Acid-Base Regulation: From Molecules to Humans

The Rocky Mountains served as the backdrop for the first APS Conference of 1996. Organized by **Robert Gillies**, University of Arizona, and **Walter Boron**, Yale University, the APS Conference on "pHysiology of Acid-Base Regulation: From Molecules to Humans" was held from July 12-15 in Snowmass, Colorado. The Conference, which attracted 87 scientists, explored how our understanding of the mechanisms and relevance of pH regulation has undergone dramatic changes as a result of improved techniques for measuring pH in vitro and in vivo, the application of molecular biological techniques, and the measurement of pH in nontraditional systems.

The Conference started with a welcome and overview presented by Robert Gillies, followed by a presentation from a long-time contributor to the field of pH regulation, **Albert Roos**, Washington University. During the rest of the meeting, symposia presentations by internationally-recognized investigators provided the attendees with an overview of the field and the new directions being taken by the investigative community. On two of the evenings, the organizers scheduled "open mike" sessions to encourage dialog and exchange of information. In addition,



(l to r) Walter Boron (Yale University), Albert Roos (Washington University School of Medicine), Robert Putnam (Wright State University).



Conference organizers Walter Boron (far left) and Robert Gillies (far right) with student awardees (l to r) David Porter, Hongyu Shi, and Nick Ritucci.

there were two poster sessions for the presentation of volunteered abstracts.

Thirty-seven abstracts were submitted and programmed as poster presentations for the conference; 18.9% or seven of the abstracts listed women as first authors. Four abstracts (10.8%) were submitted by investigators from outside of the Americas. The volunteered abstracts were submitted by scientists working in a number of different departments including, eight abstracts (21.6%) from departments of physiology (including physiology & biophysics and cellular and molecular physiology), seven abstracts (18.9%) from departments of medicine, and three abstracts (8.1%) from departments of surgery.

The scientific abstracts submitted by students were judged for scientific excellence, and the three best abstracts were selected for awards consisting of a \$500 check, complimentary registration, and a certificate. Awards were presented at the closing banquet to: **Hongyu Shi**, Brown University, for an abstract entitled "Intracellular pH Regulation of Isolated Turtle Heart During Normoxic and Anoxic Acidosis"; **David Porter**, Colorado State University, for an abstract entitled "RNase H Mapping and Cloning of Multiple Glutaminase mRNAs"; and **Nick Ritucci**, Wright State University, for an abstract entitled "Measurement of Intracellular pH of

Single Neurons in Brainstem Slices During Acid Loads."

The scientific success of the conference was clearly the result of the efforts of the organizers. In addition, the invited speakers, abstract presenters, and attendees provided the opportunity for the fruitful discussions that make any meeting a success. The Society also gratefully acknowledges the contributions received in support of the conference from the

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and Hoechst Marion Roussel.



pH conference poster session.

REGISTRATION

Member	19
Nonmember	24
Retired	1
Postdoctoral	9
Student	7
Guests	2
Invited Speaker	25
Total Registrants	87

Meetings

1996 APS Conference Report

Neural Control of Breathing: Molecular to Organismal Perspectives

Madison, Wisconsin, designated the most liveable city in the U.S. for 1996, served as the venue for the July 21-25 APS Conference on the "Neural Control of Breathing: Molecular to Organismal Perspectives." In order to provide the 192 conference attendees with ample opportunities to experience the city, **Gordon S. Mitchell** and his local organizing committee arranged for a pre-meeting golf outing, a tailgate party at the University of Wisconsin Memorial Union, and shopping with Shary and Barb. In addition, the sessions at the conference were arranged so that attendees could attend a concert on Capital Square with the Wisconsin Chamber Orchestra.

The conference steering committee consisting of Mitchell, **Gerald Bisgard**, **Jerome Dempsey**, **Jack Feldman**, **Marc Kaufman**, **Donald McCrimmon**, and **William Milsom** also spent considerable time organizing an outstanding scientific program with the fundamental goal of providing an opportunity for in-depth exchange of ideas concerning the central neural control of breathing in vertebrates. In each session the organizers attempted to schedule speakers so that concepts could be examined using both a traditional mammalian bias and a comparative physiological perspective, exploring the advantages of unique experimental preparations for their technical and conceptual power. In addition, the topics were discussed on molecular, cellular, synaptic, and network levels, providing the basis for mechanistic insights into system behavior expressed in intact, behaving organisms.

The Conference started Sunday afternoon with a symposium and was followed by the Opening Reception and tailgate party. On subsequent days there were six additional symposia and two poster sessions for the volunteered abstracts. The schedule provided opportunities for considerable interaction between the invited faculty, students, and other conference registrants.



Breathing conference poster session.

Ninety-four abstracts were submitted and programmed as poster presentations for the conference. Twenty-three of the abstracts (24%) listed women as first authors. Ten abstracts (11%) were received from laboratories outside of the Americas and eight abstracts (8%) were received from U.S. government laboratories. The volunteered abstracts were submitted by scientists working in 20 different departments, with the greatest contribution coming from physiology-related departments (physiology, physiology & biophysics, molecular & cellular physiology, physiology & pharmacology) for a total of 31 abstracts (32%). Abstracts were also received from comparative bioscience (11 abstracts or 12%), neuroscience/neurobiology/neurology (eight abstracts or 8%), preventive medicine (six abstracts or 6%), and zoology (six abstracts or 6%).



Breathing conference awardees.

The scientific abstracts submitted by students were judged for scientific excellence, and the six best abstracts were selected for awards consisting of a \$500 check, complimentary registration, and a certificate. Awards were presented at the banquet by the organizers to: **J.H. Singer**, University of Washington, for an abstract entitled, "Presynaptic Inhibition of Glutamatergic Synaptic Transmission to Rat Motoneurons by Serotonin"; **Karen Birgit Bach**, University of Wisconsin, for an abstract entitled, "Post Hypoxic Depression of Phrenic Burst Frequency in Rats Requires 2 Adrenergic Receptors"; **Eric M. Horn**, University of Illinois, for an abstract entitled, "Acute Systemic Hypoxia Increases Neuronal Fos Expression in the Caudal Hypothalamus of Conscious Rats"; **Emilio Mazza, Jr.**, UMDNJ-Robert Wood Johnson Medical School, for an abstract entitled, "Hypoxic Excitation of Cultured Neurons from the Rostral Ventrolateral Medulla"; **Cory Torgerson**, University of Calgary, for an

Meetings

abstract entitled, "Ontogeny of Central Chemoreception During Fictive Gill and Lung Ventilation of an *in vitro* Brainstem Preparation of the Larval Bullfrog; *Rana catesbeiana*"; and **Erin Seifert**, McGill University, for an abstract entitled, "Effects of Vagal Blockade on Respiratory Timing Before and After Baclofen, a GABA_B Receptor Antagonist, in Rats."

Instead of the traditional after-dinner scientific speaker, Gordon Mitchell arranged for a comedian to entertain the attendees. Ron Dentinger presented a 30-minute comedy routine that provided us with an opportunity to laugh at ourselves and several of the attendees who proved to be the target of some of his jokes. In addition, Josue Pizarro provided music for the pre-banquet reception.

Thanks to the efforts of Gordon Mitchell, the conference steering committee, and the local organizing committee, the conference was a scientific and social success. There were lively discussions between the invited faculty and the registrants and students had opportunities to interact with the leaders in the field. The Society also gratefully acknowledges the contributions received in support of the conference from the National Heart Lung and Blood Institute and Ohmeda, Incorporated. ♦



Comedian (left) with conference organizer Gordon Mitchell.

REGISTRATION

Member	43
Nonmember	20
Postdoctoral	33
Student	41
Retired	1
Guest	5
Invited Speaker	49
Total Registrants	192

APS Sustaining Associate Members

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



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Schering-Plough Research Institute
G.D. Searle and Company
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Wyeth-Ayerst Laboratories

(continued from page 269)

animals with a common genetic background. This means that they are too small or immature for some research, and they may share a defect that might affect the outcome of a physiological research project. Random-source animals are readily available in a variety of ages, sizes, and genetic backgrounds. It is therefore relatively easy to obtain large, mature animals free from inbred defects. Some research models call for one or more of the qualities most likely to be found in random-source animals:

One APS member is studying how blood loss leads to shock, which causes damage to blood vessels and can trigger multiple organ failure. This is a life-threatening condition seen every day in hospitals. This researcher first tried without success to study this problem with rats. He found that a large animal model was needed because of the intricacies of the surgery and experimental procedures, which involve monitoring blood vessel injury in a single organ. It is impossible to examine those changes in a small animal without causing complications in other organs. His research protocol calls for dogs weighing 50-60 pounds.

Another APS member is studying the effects of reduced blood flow and lack of oxygen delivery on the intestines, which is pertinent to the study of inflammatory bowel disease as well as treatment of traumatic injuries. The researcher uses dogs because their digestive system is more similar to that of the human being than that of farm animals such as sheep or pigs. He uses large dogs — approximately 45 pounds — because of the need for an animal with large diameter blood vessels.

There is a need for large animal models to study how aging affects the cardiovascular system. To date, much aging research has been done with a particular strain of rats, but there are limits to how much this kind of data can be applied to human beings. Given their proven value in other research on

heart disease, good models might be developed using older random-source dogs.

Random-source animals also play an important role in the medical education of physicians and veterinarians, who need to perfect their skills before they begin seeing patients.

The American Physiological Society has a long-standing commitment to humane treatment for laboratory animals, and has long been a leader in the movement to establish scientifically-based standards for animal care. The APS is deeply concerned about both sides of the issue before the committee — how to be certain that researchers have access to the animal subjects they need, and at the same time how to assure pet owners that their animals will not unwittingly become research subjects. The APS recognizes the importance of random-source animals to certain lines of research and has long urged its members to be certain that they only use animals that have been legally acquired.

Thirty years ago when the Animal Welfare Act (AWA) was first passed, many of the random-source dogs and cats used in medical research came from the nation's pounds and shelters. Now, relatively few animals come directly from pounds, although many come indirectly through Class B dealers. Class B dealers have become important suppliers of random-source animals because there has been a systematic nationwide campaign by animal activists to close off researchers' access to pounds and shelters. In some places they successfully sought a state law or local ordinance forbidding the transfer of pound animals. In other instances they instituted a stated or unstated policy in a shelter not to release animals for research. For some institutions there is no alternative left except Class B dealers.

Meanwhile, the AWA was expanded to add further provisions to ensure that pets would not inadvertently be used for research. For example, the

1990 AWA amendments required that Class B dealers purchase dogs and cats only from specified sources, namely, individuals who had raised the animals on their own premises, pounds and shelters, and other licensed Class B dealers. Class B dealers are also required to keep identification records for each dog and cat, including the name, address, and license tag and driver's license numbers of the individual who sold it to them. They must transfer a copy of these records to the research facility along with the animals. The law further requires that pounds and shelters hold dogs and cats for 10-15 days before transferring them to a Class B dealer, thus giving owners time to reclaim lost pets.

If all the provisions of the Animal Welfare Act were working properly, there would be no further need for discussion. Unfortunately, USDA has not had the enforcement authority or inspection resources to make the system work as Congress intended. Because of this, many research facilities seek independently to verify that the Class B dealers they purchase from comply with both the animal care and record-keeping requirements of the law. No one is satisfied with the status quo. Clearly, the USDA needs to be provided with the authority and resources it needs to enforce the law.

H.R. 3393 and H.R. 3398 offer a simplistic solution: make it impossible to use dogs and cats not bred for research by eliminating Class B dealers, placing cumbersome requirements on pounds that wish to provide animals for research, and severely limiting individual donations of research animals. But this is a deeply flawed solution, and APS urges the Subcommittee to reject it.

According to sponsors and supporters, this legislation is needed because of a massive conspiracy to steal 1-2 million pets and sell "many" of them to research labs. However, this claim utterly lacks credibility. First of all, neither the USDA (which enforces the Ani-

Public Affairs

mal Welfare Act) nor local law enforcement have been able to confirm that systematic pet theft is taking place for any purpose, much less for research. An investigation in Jefferson County, Missouri, found no evidence to support allegations of organized pet theft. On the contrary, "Over 75% of reported missing pets turn out to be strays that wander off the property," according to the Jefferson County Chief of Detectives. Secondly the numbers in this alleged conspiracy simply don't add up. The total of number of dogs and cats used for research as of FY 1995 was 120,000, and half of those were purpose-bred. Where are the 1-2 million animals that supporters of H.R. 3393 and H.R. 3398 claim have been stolen for research?

H.R. 3393 and H.R. 3398 would require all dogs and cats used for medical research and education to be specially bred for that purpose. However, this is wasteful of animal life when there is such a huge dog and cat overpopulation problem in this country that 10 to 20 million dogs and cats must be destroyed every year by pounds and shelters. Medical research needs 120,000 of the two species combined. Why breed 120,000 animals for research when 10-20 million unwanted animals are being killed?

Under H.R. 3393 and H.R. 3398,

Class A dealers would have to supply all dogs and cats for research, and the transition period would be one year or less. This would mean that Class A dealers would not only have to more than double their output of animals, they would at the same time have to breed larger animals and hold them for longer periods of time to mature. This would mean that all dogs and cats would become much more difficult to obtain. Large, mature animals would be the most scarce of all. All of this would translate into time delays and added expense. Research would be slowed, especially projects that are privately funded by charitable contributions from patients and families of those suffering from heart disease and other killers. Our nation would do less research overall because we would be paying an unnecessary premium to breed animals for research while millions of unwanted animals are being killed.

The tragedy is that neither H.R. 3393 nor H.R. 3398 will do anything to help the thousands of pets who get lost every year through owner negligence. Animals do stray if their owners do not house them in a fenced yard. Some are hit by cars or attacked by other animals, and undoubtedly some end up being destroyed by pounds and shelters. But ultimately, it is up to pet owners themselves to provide a safe environment

and identification in case the animal does stray. Permanent identification, such as a tattoo or implanted microchip, provides added assurance, but once again, this is up to the pet owners themselves. Research facilities do their part by screening all dogs and cats for signs of microchips or tattoos in the unlikely event that a pet should end up in a research lab.

The ideal solution is to use unwanted pound animals for medical research. Stray pets could be protected not just by the current system of mandatory holding periods, but also by selecting research subjects from animals voluntarily relinquished if the owner signs a consent form indicating willingness to allow the animal to be made available for research. Another element of the solution would be for Congress to provide the USDA with adequate personnel resources and enforcement authority to ensure compliance with the Animal Welfare Act. This, of course, is an area where your Subcommittee could strengthen the law and approach the Appropriations Committee to request increased Animal Welfare Act enforcement funding, and we urge you to do so. Researchers do not want anyone's pet, but they do want to be able to continue their work to develop cures and treatments to reduce animal and human suffering. ❖

Congress To Act on Funding Measures

Congress returned to session after the Labor Day weekend with a great deal of legislative business before it. The USDA funding bill had been signed into law during the August recess, and the VA-HUD-Independent Agencies funding measure was expected to come to the

Senate floor on September 3. That bill also provides funding for NSF and NASA. The prospects for NIH funding were more uncertain, however, because the Senate Appropriations Subcommittee on Labor-HHS-Education still had not scheduled a date to mark-up its bill.

With an October 3 adjournment planned, it remained likely that some of these funding measures would have to be combined into a continuing resolution. Further details will be provided in the next issue of *The Physiologist*. ❖

(continued from page 269)

lenged the need for the legislation and pointed out the severe effect it would have on biomedical research.

The rest of the hearing consisted of testimony from the USDA and from two panels of witnesses. The first, organized by the National Association for Biomedical Research, criticized the proposed legislation and included cardiothoracic surgeon and APS member Larry Stephenson, MD, of the Wayne State University School of Medicine. The other panelists were orthopedic researcher Jorge Galante, MD, of the Rush Arthritis and Orthopedic Institute in Chicago; Lester Crawford, DVM, Executive Director of the American Association of Veterinary Medical Colleges and a NABR board member; and NABR President Frankie Trull. The APS submitted a written statement critical of the proposed legislation (see page). The final panel consisted of supporters of the legislation, including representatives of the Society for Animal Protection Legislation, the Animal Welfare Institute, and American Humane Association, as well as Barbara Orlans, PhD, of Georgetown University's Kennedy Institute for Ethics and pet owner Norman Flint.

Protections Under Current Law

As the researchers noted in their testimony, the Animal Welfare Act (AWA), which is the primary federal law that regulates the purchase, sale, transport, and care of animals in medical research, makes it illegal to buy or sell a stolen animal. It further requires that Class B dealers purchase dogs and cats only from individuals who have raised the animals themselves, from pounds and shelters, and from other licensed Class B dealers, that animals may not be obtained for research using "false pretenses, misrepresentation or deception," and that they must inform sellers that the animals might be used in

research. Dealers must also keep identification records for each dog and cat, including the name, address, and social security, license tag, and driver's license numbers of the individual who sold it. If an animal is purchased from a pound or shelter, they must make certain that the animal was held for at least five days including a Saturday. They must then hold pound animals for another five days and animals from shelter for another ten days to give pet owners a chance to locate missing animals. Many of these provisions have been implemented since 1989, but animal activists continue to cite "horror stories" that predate the changes.

Random Source Animals in Research

Assistant Secretary of Agriculture Michael Dunn told the subcommittee about problems USDA has had in ensuring that Class B dealers comply with record-keeping requirements of the AWA. Dunn estimated that about half of the 89,420 dogs used in research in fiscal year 1995 were purpose bred and the remainder were so-called random source or non-purpose-bred animals. Dunn said that suppliers of these random-source animals were also evenly divided between Class B dealers and municipal pounds, which each provided about a quarter of the total number of animals used. (USDA does not actually collect statistics on sources of animals, and in its testimony, the APS cited a NABR study which estimated that probably less than 15% of random source dogs come directly from pounds. However, exact figures are unknown, and some Class B dealers do purchase pound animals and resell them to research institutions after providing veterinary care to improve their health status. The APS statement also noted that random-source dogs and cats can be the most suitable model for research that requires animals that are physiologically mature, large in size, and free from genetic peculiarities of inbreeding that

could affect the outcome of the study. Class A dealers generally supply purpose-bred animals that are small, young, and share a genetic background, making them more suitable for other kinds of research.)

Compliance Problems Cited

Dunn noted that most of the 1,113 registered Class B dealers are actually involved in the wholesale pet trade with fewer than 50 dealers supplying most of the dogs and cats for research. This number is down from 100 dealers supplying research facilities two years ago. Furthermore, only 10 dealers sell more than 800 dogs and cats per year, and the numbers continue to decline as researchers move toward substituting other species or purpose-bred dogs and cats where possible.

In 1993 USDA's Animal and Plant Health Inspection Service (APHIS) conducted a study using the records of seven Class B dealers in the south central and southeastern US to try to locate their animal suppliers. Fourteen of the 216 individuals or organizations identified as suppliers said they had not sold any animals to that dealer, and another 50 could not be located based upon the information in the dealer's records. There were also 15 instances where the supplier claimed to have sold a markedly different number of animals than what the dealer's records indicated. In addition, there were five incorrect names, 18 incorrect driver's licenses or social security numbers, and 26 incorrect addresses, although presumably those individuals could still be located. Since auditing these particular dealers, USDA has since revoked the license of one, suspended another's for a year, and assessed significant fines against others with some cases still pending. Dunn said that USDA has also begun conducting quarterly inspections of all Class B dealers who supply medical research facilities as well as conducting random "tracebacks" on a few of their animals.

USDA Supports “Phase Out”

While the administration has not taken an official position on the legislation, Dunn said USDA “supports the intent” of H.R. 3393 and H.R. 3398 to eliminate Class B dealers. He did indicate, however, that he thought a phase-out over two-year was a more “appropriate” time period. H.R. 3393 would take effect after one year, and H.R. 3398 after only three months. Dunn also opposed provisions of H.R. 3398 that would require pounds providing animals for research to register with USDA and to meet the same recordkeeping and certification requirements as Class B dealers. In addition, he pointed out that random-source animals are important because purpose-bred dogs and cats are not suitable for all kinds of research.

Dunn agreed to provide the subcommittee with information on what enforcement actions USDA has taken against noncompliant Class B dealers, the number of animals annually reported stolen, how many animals are euthanized each year in pounds and shelters, and the number of pets donated by owners for research. In addition, Chairman Gunderson asked USDA to conduct a survey of states to determine where and how often pet theft actually occurs. He also asked the department to provide his subcommittee with recommendations for how USDA can speed up the process of meting out punishment to Class B dealers who violate the AWA and what changes to USDA’s enforcement authority Congress would have to make.

Dunn told the panel that eliminating Class B dealers as a source for research cats and dogs would alleviate “a headache” for the department, even though it would save relatively little money. Rep. Brown, a cosponsor of H.R. 3398, responded that “it is a bigger headache to have a law on the books that is not adequately enforced.” USDA was also chided for its tardiness in

delivering its annual report on animal use statistics that was due April 1, for excessive delays in closing down dealers who violate the law, and for not having come to Congress to request the funds and enforcement authority it needs to carry out the law.

Researchers Critique Legislation

In his testimony opposing the legislation, APS member Larry Stephenson told the panel that random-source dogs are imperative for his research on a skeletal muscle ventricle, a device that uses skeletal muscle to help a damaged heart pump blood. Jorge Galante of the Rush Institute explained that random-source dogs are needed in his research to develop safer, longer-lasting materials for total joint replacement because dogs bone tissue is physiologically most similar to humans. Random-source animals are best because the research requires large, older animals whose joints undergo the same stresses as humans, and it would be prohibitively expensive for breeders to produce such animals. Lester Crawford of the American Association of Veterinary Medical Colleges discussed the importance of random-source dogs and cats in veterinary medical research and in veterinary and medical education. Every panel member emphasized that researchers do not want to use pets and that the medical research community believes that USDA ought to strictly enforce all AWA provisions regarding Class B dealers. They also noted that H.R. 3393 and H.R. 3398 would do nothing to protect people’s pets, but they would prevent research facilities from utilizing less than 1% of the estimated 5-10 million abandoned dogs and cats killed by pounds each year.

Noting his desire to be equally tough with all witnesses, Chairman Gunderson put forth the view that pet theft might well be a problem even if no hard evidence of its existence can be

presented. He also asked the research panel whether animal researchers abide by a code of ethics and offered to try to mediate a compromise between researchers and those professing concern for stolen pets.

The final panel advocated the animal welfare/animal rights position that pet theft is a serious problem and that Class B dealers should be eliminated as sources for research dogs and cats because they part of the problem. Former USDA official Patricia Jensen, who testified on behalf of the Society for Animal Protection Legislation, stated that while she was Acting Assistant Secretary of USDA, she saw “Class B dealers routinely violate the Animal Welfare Act.” Robert Baker an investigator for the American Humane Association, said that “Easy money from the sale of dogs and cats to the biomedical field has encouraged unscrupulous individuals to steal family pets for profit to provide a cheap and ready supply of dogs and cats for biomedical research.” Blown-up photographs of dogs caged in deplorable conditions that were displayed during Baker’s testimony dated from 1985 — before the current AWA regulations were in place. Barbara Orlans of the Kennedy Institute for Ethics produced a statement from former Deputy Surgeon General Robert Whitney, who spent 22 years at the NIH, which supported H.R. 3398 as “a moderate, sensible approach which will allay our public benefactors’ concerns about research animal procurement and care” and told the panel that random source animals are inappropriate research subjects. Norman Flint testified that in 1988 he had unwittingly given his two dogs that he wanted to find new homes for to a Class B dealer who sold them to research facilities.

As per Congressional procedure, the subcommittee will publish a record of the hearing, which will include the APS statement. No further legislative action has been scheduled at this time.❖

Ideas Sought by NIH on Peer Review Proposals

The Rating of Grant Applications (RGA) subcommittee of NIH's Committee on Improving Peer Review has made preliminary recommendations as part of NIH's ongoing reinvention of government activities. An overview of the report has been posted on the NIH's World Wide Web site under the Office of Extramural Research at <http://www.nih.gov/grants/rga.htm>. The complete report is also available for download. NIH is requesting that the scientific community comment on the proposed changes.

The RGA Subcommittee recommended that unsolicited research project grant applications be scored on the basis of three distinct criteria — significance, approach, and feasibility — and that separate numerical ratings be assigned for each criterion. Based upon psychological literature about how distinctions are made, the panel recommended that the rating scale should provide only between eight and eleven scoring levels, i.e., from 0 – 7 or 0 – 10. Further, proposals that have more of the characteristic being evaluated ought to be given higher numerical scores, rather

than giving them lower scores, as is the current practice.

The RGA Subcommittee also recommended that scores be reported with only two significant digits to enable the institutes to make project selections more easily on the basis of their scientific interests, program balance, and diversity. This would mean that applications that might now be rated as 145, 146, and 147 would all be assigned the identical score of 150. Another option is to eliminate the single score for the overall merit of the proposals or to compute them as an arithmetic average or algorithm of the three criteria. The panel also recommended development of a procedure to standardize scores given by individual reviewers and then to average scores among reviewers.

There has already been considerable discussion including at the Division of Research Grants Advisory Committee and at NIH Review Meetings. The idea of using distinct review criteria has been broadly supported, although there are a range of views as to what are the most appropriate criteria. **Keith Yamamoto** has suggested a set of

four criteria including impact, feasibility, creativity/innovation, and investigator/environment.

"Changes to so critical an element of peer review as the system of rating grant applications should not be implemented without the participation and contributions of the scientific community that they will affect," according to the overview document. The merits of each of these recommendation are being considered separately, and comments from the scientific community were requested to be sent by October 1, 1996. Address comments to dder@nih.gov

The RGA proposals will also be reviewed by the directors of the Institutes and Centers and by NIH-wide standing committees such as the Extramural Program Management Committee, the Review Policy Committee, and the Program Officers and Project Officers Forum. The earliest that any recommendations could be put into place would be the fiscal year 1998 grant review cycles, in which case the implementation decision would need to be made by January 1997. ♦

Senate Votes to Retain NASA's Bion Funding

On September 4, the Senate voted to retain funding for NASA's Bion research program. By a vote of 42-54, the Senate rejected a move by Sens. Robert Smith (R-NH) and Russ Feingold (D-WI) to eliminate funding for US participation in the joint US-French-Russian program to study the effects of weightlessness using rhesus monkeys.

Smith and Feingold claimed that the research was a waste of taxpayers' funds because scientists already know what all there is to know about how spaceflight affects human beings. Those who spoke out in support of the Bion program and against the Smith-

Feingold amendment included VA-HUD Appropriations Subcommittee Chairman Kit Bond (R-MO); subcommittee members Conrad Burns (R-MT) and Robert Bennett (R-UT); former astronaut John Glenn (D-OH); heart-lung transplant surgeon and innovator Bill Frist (R-TN); and Barbara Mikulski (D-MD), the senior Democrat on the VA-HUD-IA Appropriations Subcommittee.

These Senators disagreed with the idea that enough is known about how weightlessness affects the body. They also pointed to the multiple rounds of peer review since 1988 in which the sci-

ence was judged to be important and that there is no alternative to the use of an animal model. These Senators said that Congress should not micromanage an agency that has conducted appropriate peer review of the science. They also defended the use of animals in research and noted that the Bion protocols had been reviewed according to US animal welfare laws.

In June, the House voted to stop the Bion project, so a final decision will be made by a House-Senate conference committee, which was expected to meet later in September. ♦

NIH Makes a Cameo Appearance at Political Conventions

NIH was briefly thrust into the spotlight during the Democratic and Republican national conventions in August. Both parties positioned themselves for the fall campaign by competing to associate themselves with the nonpartisan issue of medical research.

In a moving address to the opening session of the Democratic convention, paralyzed actor Christopher Reeve called for new investment in medical research to address spinal cord injury, Alzheimer's disease, Parkinson's disease, stroke, multiple sclerosis, and AIDS. Reeve, paralyzed in a riding accident, was assisted by a mechanical respirator. He spoke as an advocate for medical research and the rights of disabled Americans.

A Congressional Republican on the NIH appropriations subcommittee immediately took issue with the Democrats' effort to position themselves as the NIH's champion. At a press conference the day after Reeve's speech, Rep. Henry Bonilla (R-TX) pointed out that Republicans in Congress "have always had a strong record of supporting medical research in this country." Bonilla, a member of the House Appropriations Subcommittee on Labor-HHS-Education, also criti-

cized President Clinton for recommending cuts to the NIH budget.

Both political parties' platforms made favorable mentions of biomedical research, albeit in the context of increasing disease-specific funding. In the Republican platform, the section on improving America's health care, states that the party "reaffirm[s] our traditional support for generous funding of medical research, especially through the National Institutes of Health, and for continuing federal support for teaching hospitals and medical schools"

The Republican platform goes on to call for increased funding for AIDS, Alzheimer's disease, breast and prostate cancer, and diabetes. It cites diabetes as an example of how medical research and preventive care can make a substantial contribution to improved well-being and lower health-care costs. "Scientific discoveries, made possible by federal funding of medical research, have led to new efforts to prevent diabetes, as well as new treatment strategies to forestall the development of its debilitating and life-threatening complications," the document states.

The Democratic platform notes that the Clinton administration has "made AIDS research, prevention, and treatment a top priority, increasing funding

by almost 40 percent." It states that the Democrats are "committed to finding a cure for AIDS," as well as providing other assistance to people living with AIDS, and to "serious biomedical research which promises breakthroughs for so many diseases; and doing more to help all Americans live longer, healthier lives." The Democrats "recognize the enormous contribution of our teaching hospitals and medical schools — they lay the foundation for the best medical care in the world, and we will continue to promote policies that strengthen them." The platform also states that the administration has "paid special attention to women's health issues, including a 65 percent increase for breast cancer research. We are committed to finding a cure for breast cancer and we pledge to continue supporting funds for innovative research, and access for all women to high quality treatment and care."

FASEB submitted its views on the importance of basic biomedical research to both parties' platform committees. The FASEB materials, which APS helped develop, emphasized the health and economic benefits of biomedical research and urged the next president to select a life scientist as his chief scientific advisor. ♦

New Bioethics Commission to Focus on Human Subjects

The first priority of the newly-appointed National Bioethics Advisory Commission will be protecting the rights and welfare of human research subjects, the White House has announced. In late July President Clinton named 15 members to the advisory panel he established by Executive Order last October to "provide guidance to federal agencies on the ethical conduct of current and future human biological and behavioral research."

The Commission's members will provide expertise in philosophy, theology, law, and medicine. Its creation was recommended in the Report of the

Advisory Committee on Human Radiation Experiments. That panel evaluated the how a number of research studies were conducted during the Cold War era in which human subjects were unwittingly exposed to radiation.

Since 1985, federal law has mandated that research protocols involving human subjects must be cleared by a local Institutional Review Board. Based upon what transpired with the earlier radiation experiments, the Commission will make recommendations for additional procedures to protect human research subjects.

The bioethics panel is also expected to consider issues related to the management and use of genetic information (i.e., the patenting of human genes), and possibly other topics as well. Since the late 1970s there have been periodic calls for the appointment of an authoritative federal panel to weigh the implications of certain categories of ethically sensitive research in order to decide whether the federal government should provide funding for or otherwise regulate those activities. ♦

Appeals Panel Clears Imanishi-Kari of Misconduct Charges

After a decade of allegations, investigations, and appeals, researcher Thereza Imanishi-Kari has been cleared of charges that she falsified data in a 1986 paper published in the journal *Cell*. The case was frequently referred to as “the Baltimore case” because Imanishi-Kari’s most prominent co-author and defender was Nobel Laureate David Baltimore.

A Department of Health and Human Services review panel ruled on June 21 that Imanishi-Kari was not guilty of the misconduct allegations raised against her by Margot O’Toole. O’Toole was a postdoctoral fellow in Imanishi-Kari’s laboratory, who challenged her mentor’s work after failing in repeated attempts to replicate the experiments Imanishi-Kari reported on

in the *Cell* paper. The case hit the national spotlight after Rep. John Dingell (D-MI), who was then chairman of the House Energy and Commerce Committee, held hearings into the Massachusetts Institute of Technology’s and NIH’s handling of the case.

In October 1994, NIH’s Office of Research Integrity (ORI) ruled that Imanishi-Kari had falsified data and should be barred from receiving NIH grants or contracts for a 10-year period. “The Office of Research Integrity did not prove its charges by a preponderance of the evidence,” wrote the HHS Research Integrity and Adjudications Panel. The panel held six weeks of hearings starting in June 1995, amassed a transcript that ran to 6,500 pages, and reviewed 70 original laboratory note-

books. The adjudications panel cleared Imanishi-Kari and ruled that no further administrative actions should be taken against her.

Two of the adjudications panel’s key findings were that the ORI had “found that Dr. Imanishi-Kari had misrepresented data, without fully understanding how she had represented them,” as well as that “most of the data allegedly fabricated were not even included in the *Cell* paper.” The panel criticized ORI’s findings on the grounds that much of what it had presented was “irrelevant, had limited probative value, was internally inconsistent, lacked reliability or foundation, was not credible or not corroborated, or was based on unwarranted assumptions.” ♦



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Leaving the Lab Bench

I received my PhD from the Department of Microbiology at the University of Alabama at Birmingham in June 1992, energetic, enthusiastic, and confident in my abilities. My thesis work was on the gene responsible for cystic fibrosis. I began my postdoctoral career in the program in Molecular Medicine at the University of Massachusetts Medical Center in a very intense, competitive and very visible molecular biology laboratory in July 1992. After writing several postdoctoral fellowship applications during the course of my first year, the American Cancer Society awarded me a three-year fellowship. As my fellowship progressed, and I went from project to project, my energy and enthusiasm for working at the bench began to diminish. I was still enthusiastic about science, but the ups and downs that we all go through at the bench were beginning to get to me. It was becoming clear to me from looking at the progress of my research, as well as the ability of my colleagues to find permanent positions in either academics or industry, that a second postdoctoral fellowship would be necessary if I wished to stay in research. My unhappiness was also due to other reasons including pressure to publish, the difficulty in obtaining funding, long hours, and, of course, a salary that was less than ideal. I felt a second fellowship would do nothing to alleviate these hardships.

Alternatives to Research

As a bench scientist, I thought there were very few alternatives to research. It is with those thoughts that about a year ago, I started to question ways I could use my training, stay close to science, but leave the bench. After many months of introspection, I decided to look for a position away from the bench. In coming to my decision, my primary concern was: What if I wanted



Randy Krauss uses his laboratory experience in his new position with CityLab in Boston.

to return to the laboratory bench? After discussing this issue with several colleagues, I came to the conclusion that if I did want to return, I would probably have to start at the postdoctoral level again. I decided the risk was worth it.

I became aware of the fact that friends and family were always asking me about a news report they heard or read related to science or medicine. What does this mean or that mean? I realized that people outside laboratory research might also benefit from my knowledge of molecular biology. I became interested in increasing the public's awareness of biotechnology and began to collect biotech educational materials. I made a list of careers that I thought may benefit from someone trained in molecular biology, which included, but was not limited to, educators, publishing companies, law firms, venture capital firms, consulting firms, and public relations groups. I believed that all these groups may need someone with my background to interpret or explain science. Why do these companies need a scientist in their company or organization? Law firms, for example, need scientists to interpret scientific data for forensic cases or patents. Public relations or venture capital groups need scientists to explain the significance of a laboratory breakthrough in order to

interest the people they are trying to reach. Public relations firms must inform the public as to how a product may benefit them, as well as to answer questions and concerns that the public may have about a particular type of technology or product. Venture capitalists will not invest in a company if they do not understand how a company will use a technology or a product to make money.

Develop a Networking Base

I spent several months developing a new networking base, as most of my contacts in science were at the laboratory bench. I made a list of names of people and companies from local biotechnology organizations, the World Wide Web (i.e., see chart), and newspaper articles that discussed a scientific breakthrough, a particular program, or relevant business news. Making contact with these people was the hardest part and was an emotional roller coaster. The people I contacted fell into three categories. The first group consisted of people who would not give me the opportunity to speak with them. Next, there were people who simply agreed to keep my Curriculum Vitae on file in case they or others had a position that became available, without providing me with information. Finally, there were people who would spend a significant amount of time talking to me, providing me with information and names of colleagues who may have the need for someone with my background. Often these people were extremely impressed with my desire to create opportunities on my own. Almost immediately, I confirmed my suspicion that there was a need for scientists away from the lab bench. My "network of contacts" has continued to be of assistance to me even as I begin my new career.

Each informational meeting or interview was a learning experience. I

had to always explain my reasons for leaving the bench, my ability to adapt to the new world I would be entering, and how I could contribute to the company or organization with whom I was interviewing. Unlike an interview for a laboratory job, where it is possible to discuss science for the entire meeting, these interviews often covered many areas and at times, because this was a career change, areas that I was not totally familiar with. Specifically, I was asked whether I could communicate my knowledge of science to people with little or no background in science and how I would accomplish this. After all, they may be hiring you to interpret scientific information, and if you cannot communicate the information, you will be of little benefit to them. The ability to communicate with fellow scientists does not necessarily translate into the ability to communicate with the layman. I was also asked whether I could familiarize myself rapidly with scientific literature outside my area of expertise in order to accommodate a client in an economically sound way. Basically, they were asking if I could read five articles (and not 50) on a subject and feel comfortable writing a report by the end of the day. Preparation for these interviews was key; I became familiar with trends or materials that were available about a particular interviewer, the company and equally important, the industry. Thus, when I was contemplating a career change to education, I became familiar with many educational resources that were available from biotech companies, the World Wide Web, and local education initiatives. If I interviewed in consulting, I became familiar with the stock market, the interests of local biotech companies, the business section of local newspapers, and business journals. You are not expected to be an expert in a field or area that you have not worked in, but becoming familiar with material at the very least will show interest, which in turn will send a positive message to the

interviewer indicating that you will be able to handle a career change. I would strongly recommend becoming familiar with areas that you believe may interest you before sending out letters seeking employment. First, this will help you determine if you are truly interested in a particular field. Second, it will allow you to become more knowledgeable about the field, without the appearance that you memorized information before the “big exam” or interview.

New Job

I accepted a position as Laboratory Coordinator at Boston University School of Medicine’s CityLab Program and as an Instructor in the Biochemistry Department. CityLab is a biotechnology education program designed to provide middle and high school students and teachers hands on learning experience in biotechnology. My responsibilities at CityLab are numerous and include managing the lab, troubleshooting scientific problems, designing additional experiments for students to do in the lab, teaching (at the high school, undergraduate, and medical school levels), and providing information on current techniques and overviews on subjects that teachers or students may have regarding media reports. Although I didn’t have experience in education, I was familiar with biotechnology educational materials and have a strong desire to communicate my enthusiasm for science to others. The salary was much better than a senior postdoctoral fellow, but lower than a researcher’s salary, in part because you are not writing grants to fund your own research.

Transition Period

When I informed my colleagues in the lab of my decision, I was met with surprise and enthusiasm. Surprised, because they had not really considered the possibility nor explored the opportunities away from the bench. They

were enthusiastic, because they felt the position was a good opportunity for me. Equally as important, many of them were able to consider other opportunities for the first time. They did not feel that they had to be strapped to the laboratory bench forever. In fact, in the past couple of months, several colleagues have discovered opportunities. One colleague (a postdoctoral fellow) was courted by several biotechnology and pharmaceutical companies as a sales representative and has spoken to me at length about how happy he is in his new position. A second colleague, who is preparing to graduate, will do a postdoctoral fellowship, but will also teach part-time at a local college and has found a contact who is interested in her doing some scientific writing.

The period before finding this position was a difficult one. Once I made the decision to explore alternatives, I still had to wait for the right opportunity, while continuing to carry out my research project. I found looking for a job a job within itself and took several hours a night to prepare. Upon making the decision, I had several thoughts. First, I came to the realization that all the years of doing research would be coming to an end. I was not upset about this, as my reasons for leaving day to day research were very strong. However, I did reflect on the fact that I had spent most of my professional life training to be a researcher. Also, when starting any new job you wonder if you made the right choice. Upon accepting my new position, I spent the last few weeks in the lab trying to decide what to do with all the clones I had made or collected over the years, as well as all the papers that I copied and read. I left the clones in good hands in case I or others wanted to use them at a later date and I sifted through the papers and pulled out the ones that I believed may be useful in future years. I left the lab excited, enthusiastic, and anxious to start at CityLab.

Career Corner

To date, my experience at CityLab has been very positive. I am in the lab with students and teachers sharing my enthusiasm for science. A laboratory background is necessary for this position and my input is encouraged and respected. The education process is anything but one way. While I have given my scientific input, as well as a unique perspective as a "nonteacher," I have learned a great deal about the education system, about people, and their experiences. As a teacher, there is a

great opportunity to make a positive impact on their lives. I find it very rewarding to watch a student smile when he/she masters a concept or completes an experiment successfully. I have received several cards and notes from teachers and students telling me how they enjoyed their visit to CityLab. No regrets.

Randy D. Krauss
CityLab

WWW sites to explore:

http://www.bio.com/hr.hr_index.html
<http://chem.indiana.edu/pages/prores1.html>
<http://www.tiac.net/users/pmgannon/positions.html>
<http://recruit.sciencemag.org/science/features/classified/job-resources.sh1>
<http://biospace.com/g/synd/44a78c/career>
<http://www.careermosaic.com.cm.mbc>

Positions Available

Physiology and Biophysics - Faculty Positions. The Department of Physiology and Biophysics at the University of Alabama at Birmingham invites applications for three or four tenure-track or tenured faculty positions. The department is seeking outstanding individuals with strong records of achievements in all aspects of physiology whose interests complement those of current members. We are especially interested in seeking individuals in the areas of intracellular signaling/inflammation, molecular biology and electrophysiology of ion channels and other transporters, and molecular motors. Please send a curriculum vitae and statement of research plans and have three letters of recommendations forwarded by October 15, 1996, to: Dale J. Benos, PhD, Faculty Search Committee, Department of Physiology and Biophysics, University of Alabama at Birmingham, 1918 University Blvd. - 706 BHSB, Birmingham, AL 35294-0005. [AA/EOE] (8/17/96)

Cardiovascular Researcher. A postdoctoral position is available to study the functional and pathophysiological significance of angiotensin II receptor subtypes in the cardiovascular tissues. Research areas include the study of mechanisms that govern gene regulation of angiotensin II receptor subtypes in the kidney, adrenal gland, and resistant vessel in response to a variety of physiological and pathophysiological stimulations. Experience with molecular biology and cardiovascular physiology/pharmacology techniques is highly desirable. Please send curriculum vitae and names of three references to: D. H. Wang, MD, Internal Medicine, 8.104 Medical Research Building, University of Texas Medical Branch, Galveston, TX 77555-1065. (9/3/96)

Postdoctoral or Technician Position in Muscle Physiology/Biochemistry. Science graduate sought to conduct experiments in physiological properties of skinned skeletal muscle fibers and biochemical/molecular analysis of myosin isoform expression. Candidate should have technical experience in muscle physiology or biophysics as well as ability to interpret data and write scientific reports. Available immediately through 2001; \$20,000 to \$25,000 salary plus benefits. Send applications to: James J. Sciote, DDS, PhD, Assistant Professor and Chair, Department of Orthodontics, University of Pittsburgh, 2143 Salk Hall, Terrace Street, Pittsburgh, PA 15261-1932. Phone: 412-648-8419; fax: 412-648-8817.

Positions Available

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

A check or money order payable to The American Physiological Society must accompany the position listing. Purchase orders will not be accepted unless accompanied by payment. Ads not prepaid will not be printed. Copy must be typed double space and is limited to 150 words. Copy must reach the APS office before the 15th of the month, two months preceding the month of issue. Mail copy with payment to:

The Physiologist
APS
9650 Rockville Pike
Bethesda, MD 20814

Using the Internet for Your Job Search

Finding a job is a tedious and difficult process. You have to chase down leads from a variety of sources, you have to write a resume or update the one you have, and you have to research the organizations to which you apply. While it won't help you with preinterview jitters or write thank-you notes, the Internet can make your job hunt a whole lot easier.

First of all you have to get that resume into shape. If you are writing a resume from scratch, check out <http://www.resumix.com/resume/resume-form.html>. It is an HTML form that will prepare and format your resume based on the information you enter. The resulting document will still need to be edited, proofed, and polished, but it is a good start. You will also find great hints for resume building and formatting at <http://www.taos.com/resumetips.html>.

Now that you have a shiny new updated resume, you have to figure out where to send it. An excellent place to start is FASEB's Career Resources page at <http://www.faseb.org/careers>. For a fee you can place your resume in the Careers OnLine database, where it can

be stored, searched, and updated for one year. There is also a database of positions available, so you can browse for a job that interests you. The National Institutes of Health maintains a fairly current listing of job openings at <http://www.nih.gov/news/jobs>. Fed-World's listing of all open positions in the Federal government is <ftp://ftp.fedworld.gov/pub/jobs>. Be forewarned. The files are text files, and they are organized by regions rather than by position. Bio Online (<http://www.bio.com>) offers a career center that lets you search a database of job openings at many major biomedical employers. At <http://recruit.sciencemag.org/science/feature/classified/search.html> *Science* lists the recruitment advertisements that appeared in the last two issues. You can also try CareerPath (<http://www.careerpath.com>), a service that compiles the Sunday classifieds of 22 newspapers into one huge database. The Chronicle of Higher Education at <http://chronicle.merit.edu/> offers a large database of jobs in academe. Do not forget about Usenet either; jobs are posted in the bionet.employ-

ment and bionet.employment-wanted groups. (If your site does not carry the bionet hierarchy, check out <http://net.bio.net>. Most BIOSCI newsgroups are available through e-mail mailing lists.)

The next step is the most intimidating, the interview. Interviews can have several formats; your guide to recognizing various interview formats and responding appropriately is at http://www.winway.com/pages/interview_formats.htm. Tips on how to meet the interviewer's objectives and a list of appropriate questions to ask are at <http://www.jobweb.org/CATAPULT/enelow-i.html>. Do not forget to do a Yahoo or AltaVista search for the organization's home page before your interview as well.

Sometimes the job of your dreams is where you are not. If your new job means you've got to move, visit Money Magazine's Best Places page at <http://pathfinder.com/money/>. Money ranks the 300 largest urban areas in the US to find the best place to live and work; this year's Best Place was Madison, Wisconsin. You can rank factors from most to least important to find the city that would suit you best and compare the cost of living in your current and prospective hometowns.

Finding a new job is never easy, but knowing how to use the Web can get you leads, improve your resume, help you with your research, sharpen your interview skills, and make moving simpler. It may be the most important job-hunting tool you have. Use it!

Flames, praise, suggestions, and links you would like published in a future issue of *The Physiologist* may all be sent to kthompso@aps.faseb.org. ♦

Point your browsers at ...

<http://weber.u.washington.edu/biophage> for the home page of the Department of Physiology and Biophysics at the University of Washington, submitted by Michelle Trudeau.

<http://www.scrs.umanitoba.ca/Physiology> for the home page of the University of Manitoba's Department of Physiology, submitted by Larry M. Jordan.

<http://www.dundee.ac.uk/AnatPhys> for the home page of the Department of Anatomy and Physiology at the University of Dundee, submitted by Peter M. Taylor.

<http://www.uc.edu/www/physiology/index.html> for the Department of Molecular and Cell Physiology at the University of Cincinnati School of Medicine, submitted by Robert O. Banks.

Moving?

If you have moved or changed your phone, fax, or e-mail address, please notify the APS Membership Office at 301-530-7174 or fax to 301-571-8305.

Chapter News

President's Report on the First Scientific Meeting of the Iowa Physiological Society

The first scientific meeting of the Iowa Physiological Society was held in conjunction with the Iowa Academy of Science, Physiology Section, at Simpson College on April 26-27, 1996. The combined meetings included 22 abstracts by physiologists from seven separate institutions. The Iowa Physiological Society General Session was especially wellattended and very positive. The posters were busy for almost the entire two-hour session, and virtually all participants took the opportunity to fully review each. A buffet lunch was provided by physiologists from the University of Osteopathic Medicine. By the end of the meeting, membership totaled 35.

Brian Duling, a former APS president, spoke at a special session sponsored by the American Physiological Society. The lecture was entitled, "*Is There a Lumen in Capillaries? From Exercise Physiology to Endothelial Cell Glycocalyx.*" Duling discussed the role of the glycocalyx in determining capillary hematocrit and its relation to tissue oxygen delivery from discovery through the latest advances and theories. Duling's talk was well-received by the membership.

The business meeting opened with greetings from the American Physiological Society by Duling, who also emphasized the importance of local chapters in the educational process and in maintaining support for the sciences. The President, Richard McCabe, discussed the Articles of Incorporation that had been filed with the Secretary of State of

Iowa on behalf of the Iowa Physiological Society for non-profit corporate status. McCabe also introduced the proposed bylaws, based on the Ohio Physiological Society bylaws provided by **Peter Lauf**. Final amendments were made, and the bylaws adopted at this time. **Donald Stratton** of Drake University was elected to the office of President-Elect. At the close of the meeting, **Charles Wunder** assumed the office of President and **Richard McCabe** assumed the office of Past President.

I want to express my heartfelt thanks to all those who assisted in forming the Iowa Physiological Society over the past two years. I am especially indebted to **Luke Mortensen**, who cheerfully accepted and capably accomplished every task asked of him and more. I want to thank the American Physiological Society for their foresight in providing the mechanism and funds to get us off the ground. I hope that the Iowa Physiological Society will continue to prosper and become a key catalyst and agent for the benefit of physiology and related sciences throughout Iowa and the surrounding region. ❖

Richard D. McCabe
Past-President, Iowa Physiological Society
June 17, 1996

The Physiologist

is now available via the World Wide Web.
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<http://www.faseb.org/aps/tphys.htm>

Promising Areas of Cardiovascular Aging Research

A scientific panel, composed of non-federal scientists, was recently convened by the Geriatrics Program, National Institute on Aging (NIA). The panel's charge was to identify promising new areas for research opportunities in cardiovascular aging research. The Geriatrics Program supports research on clinical problems that occur predominantly among the elderly or are associated with increased disability, morbidity, and mortality in older people. The cardiovascular area is one of several programs administered through the Geriatrics Program and is currently undergoing expansion. The scientific panel was specifically convened to address program expansion in the cardiovascular aging field.

Although age is a major risk factor for cardiovascular disease, the precise reasons remain to be determined. To better appreciate the link between aging and development of disease, we need to clearly understand normal aging, i.e., aging in the absence of disease and also how aging increases cardiovascular morbidity. Age-associated changes in cardiac function, circulatory hemodynamics, blood pressure regulation, and lipid metabolism all contribute to the development of cardiovascular disease in the elderly. Ongoing research supported by the NIA is defining important age-related changes in the cardiovascular system. Yet, to ensure continued success and productivity in this important area, new research is needed to expand, and to integrate, the wealth of knowledge already accumulated at the basic and systems physiology levels. Expanding research in the cardiovascular aging field will significantly augment our understanding of human health, aging processes, and susceptibility to cardiovascular disease.

The following research recommendations are neither prioritized nor meant to be restrictive. They simply represent a synthesis of ideas generated by the

scientific panel and later augmented by NIA staff.

Recommendation #1. Foster clinically related research, focused on an integrative approach, in continuing to define important age-associated changes in the cardiovascular system and how these normal changes may contribute to cardiovascular morbidity. The goal is to stimulate new research that focuses on incorporating the advances made in cellular, structural, and molecular biology (using the tools of molecular biology) to the study of function in whole animals and humans.

Recommendation #2. Expand research on cardiovascular-renal interactions in aging including, among others, the importance of gender and racial differences, changes in arterial blood pressure control and fluid and electrolyte balance, neurohumoral influences (e.g., changes in renal responsiveness to aldosterone and vasopressin), autonomic function and reflex mechanisms, and drug metabolism and clearance. An additional area of importance includes the role of the aging kidney in age-associated cardiovascular diseases including hypertension, coronary heart disease, and congestive heart failure. This systems physiology approach to aging research is not restricted to cardiovascular-renal interactions and may include other relevant systems.

Recommendation #3. Develop new methodologies to measure blood vessel wall stiffening and support new studies that will enhance our understanding of vascular stiffening in aging and its link (if any) in promoting atherosclerosis. Studies should focus on vascular-ventricular interactions in aging and the importance of vascular stiffening in altering cardiac structure and function. Once thought to be a part of normal aging without consequence, stiffening

of the large elastic arteries, such as the aorta, may lead to increased susceptibility to cardiovascular disease. The NIA has recently released a program announcement on "Aging, Vascular Stiffness, and Cardiovascular Function" (NIH Guide, Vol. 24, No. 24, June 30, 1995).

Recommendation #4. Examine the effects of aging on cardiac diastolic function, including the relationship between systolic and diastolic function, e.g., adaptation, remodeling, and/or dysfunction during aging. This area of research is important because about 40% of older heart failure patients have diastolic dysfunction (with normal systolic function) as the etiology of their condition. The importance of age-associated changes in the atria (e.g., development of fibrosis) in increasing susceptibility to atrial fibrillation, and possibly stroke, should also be investigated.

Recommendation #5. Studies should be conducted to examine the importance of gender differences in the aging cardiovascular system. Examples of studies include the effects of various sex steroids on the structure and function of the aging heart and blood vessels, regulation of lipoprotein metabolism, and body composition. Also, the importance of gender in renin-angiotensin-aldosterone reactivity and drug metabolism and clearance should be studied. The importance of gender in drug action is an understudied area. Research should also focus on ascertaining the mechanisms of action for estrogen-mediated cardioprotection in older, postmenopausal women.

Recommendation #6. Develop new approaches to enhance participation of elderly persons in exercise programs or other forms of physical activity as a means to foster health promotion and

disease prevention. The importance of physical activity was the topic of discussion at the December 1995 NIH Consensus Development Conference entitled "Physical Activity and Cardiovascular Health."

Recommendation #7. Support research on the clinical pharmacology of cardiovascular drugs in older individuals, including pharmacodynamic and pharmacokinetic studies. Cardiovascular drugs comprise one of the most widely prescribed classes of medications in the elderly. Yet, few studies focus on the special needs of the elderly (including gender and racial differences in drug action) and also may not take into account important age-associated physiological changes that may alter drug absorption, distribution, metabolism, and clearance. Development of new drugs to optimally treat age-associated cardiovascular disorders, including diastolic dysfunction in congestive heart failure, would benefit from more basic clinical investigations.

Recommendation #8. Develop appropriate large animal models for clinically related cardiovascular aging research (in vivo) that mimic the human condition. The Fischer 344 rat strain has been extensively used as an aging model. Yet, because of limitations in generalizing research data obtained from one animal model to humans, together with the known age-associated development of nephropathy and tumor

growth in the Fischer 344 strain, data derived from this model may be difficult to interpret in terms aging versus disease-related events. Well-defined large animal models are needed that both mimic the human condition and clearly separate the study of normal aging from disease development in old age. Development of transgenic large animal models is an attractive possibility.

Expanding research in these (and other) areas will lead to a more complete understanding of age-associated changes in the cardiovascular system and, moreover, how these normal changes increase cardiovascular morbidity in older Americans. New research will contribute to the development of interventions that will decrease cardiovascular disease-related disability, infirmity, and dependency. The potential public health benefit, in terms of both health care cost savings and improving the quality of life of older Americans (i.e., adding "life" to years), may be considerable.

The NIA encourages investigator-initiated research project grant applications on the topics listed and also on any other relevant cardiovascular aging issues not discussed. Training opportunities (fellowships and career development) in the cardiovascular aging field are also available. For additional information regarding these research recommendations, please direct inquiries to: Andre J. Premen, Ph.D., Geriatrics Program, NIA, Gateway Building-3E327,

7201 Wisconsin Avenue-MS-C 9205, Bethesda, MD 20892-9205. (telephone: 301-496-6761; fax: 301-402-1784; e-mail: PremenA@gw.nia.nih.gov) ♦

Andre J. Premen
National Institute on Aging

Geriatrics Program Thanks Panel

The Geriatrics Program extends its gratitude to the thirteen members of the scientific panel for their outstanding work and recommendations. Panel members include (in alphabetical order): Dr. William Applegate, University of Tennessee-Memphis; Dr. Christine Baylis, West Virginia University; Dr. Ruben Bunag, University of Kansas Medical Center; Dr. Jay Cohn, University of Minnesota Medical School; Dr. Arthur Feldman, University of Pittsburgh Medical Center; Dr. W. Dallas Hall, Emory University Hospital; Dr. William Hazzard, Bowman Gray School of Medicine; Dr. Dalane Kitzman, Bowman Gray School of Medicine; Dr. Daniel Richardson, University of Kentucky Medical Center; Dr. Janice Schwartz, Northwestern University Medical Center; Dr. Julianna Szilagyi, University of Houston; Dr. George Taffet, Baylor College of Medicine; and Dr. Peter Wood, Stanford University School of Medicine.

NIH Consensus Panel Issues Report

An NIH consensus development statement on Physical Activity and Cardiovascular Health may be obtained from the NIH Office of Medical Applications of Research (OMAR).

The report was prepared by a panel of experts who considered scientific evi-

dence presented at a Consensus Development Conference at NIH. It contains recommendations and conclusions concerning Physical Activity and Cardiovascular Health.

NIH consensus conferences bring together researchers, practicing physi-

cians, representatives of public interest groups, consumers, and others to carry out scientific assessments of drugs, devices, and procedures in an effort to evaluate their safety and effectiveness. ♦

Marvin Cassman Named NIGMS Director

Harold Varmus, Director of NIH, has announced the appointment of Marvin Cassman as the new director of the National Institute of General Medical Sciences (NIGMS). Cassman has been deputy director of NIGMS since 1989 and has served as the Institute's acting director since July 1993. NIGMS supports basic biomedical research that is not targeted to specific diseases but that increases understanding of life processes and lays the foundation for advances in disease diagnosis, treatment, and prevention.

"Cassman is an outstanding scientist and scientific program manager whose skills are ideally suited for this position at the helm of NIH's 'basic research institute.' His expertise in such areas as structural biology, biotechnology, science policy, and technology transfer will be especially valuable at NIGMS and at NIH as a whole," said Varmus.

"Over the years Cassman has proven himself to be astute at perceiving trends in biomedical science and innovative in creating new approaches to meet areas of opportunity or need," Varmus added. "His many accomplishments include a program to determine high-resolution molecular structures for use in designing antiviral drugs targeted against AIDS and a program to provide shared biomedical research instrumentation that has become a model for similar efforts at NIH and elsewhere."

Cassman was selected after a nationwide search by a committee of distinguished scientists, which recommended top candidates to Varmus.

As NIGMS director Cassman will oversee a \$947 million budget that

funds basic research grants in the areas of cell biology, biophysics, genetics, developmental biology, pharmacology, physiology, and biological chemistry. At any given time NIGMS supports more than 3,300 research grants, about 13 percent of the grants funded by NIH as a whole. NIGMS also supports research training as well as programs designed to increase the number of minority biomedical scientists.

"A major role of NIGMS is to ensure the long-term health and productivity of the basic biomedical research enterprise," said Cassman. "This means, among other things, bringing new investigators into the system in appropriate numbers through both training and research support, encouraging innovative ideas, and linking the basic science output to the requirements of society. All of this needs to be done while attempting to provide some stability to the many outstanding investigators whose ongoing research accomplishments are making the end of the 20th century one of the great periods for science in history. Attempting to balance these demands is a challenge to which we must all respond, and I look forward to leading NIGMS in its efforts to meet this challenge."

After receiving bachelor's and master's degrees from the University of Chicago, Cassman earned a PhD in biochemistry in 1965 at the Albert Einstein College of Medicine. Following a postdoctoral fellowship in the laboratory of Howard Schachman at the University of California, Berkeley, Cassman joined the faculty of the University of California, Santa Barbara.

Cassman came to NIGMS in 1975 as a health scientist administrator in the Cellular and Molecular Basis of Disease Program. In 1978 he was named chief of the program's Molecular Basis of Disease Section, and in 1985 he became director of the NIGMS Biophysics and Physiological Sciences Program. He has also worked in the Office of Science and Technology Policy, Executive Office of the President, as a senior policy analyst and as a legislative fellow on the staff of the House Subcommittee on Science, Research, and Technology.

Among the NIH committees on which Cassman has served are the AIDS Executive Committee, the Bioengineering Working Group, and the Task Force on the Commercialization of Intellectual Property Rights from NIH-Funded Extramural Research. In 1995 Cassman chaired a committee that examined the organization and activities of the NIH Division of Research Grants and made recommendations to Varmus. Many of these recommendations have been or are now being implemented. He is also a member of the National Science Foundation Advisory Committee for Biological Sciences and of the advisory board of *Chemical and Engineering News*.

Cassman's honors and awards include the 1991 Presidential Meritorious Executive Rank Award and the 1983 NIH Director's Award. He is a member of the Protein Society and the American Chemical Society. ♦

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Sustaining Associates

Know Your Sustaining Associates

Abbott Laboratories

Abbott Laboratories is a world-wide company devoted to the discovery, development, manufacture, and sale of a broad and diversified line of human health care products and services. Abbott innovations include Nembutal and Pentothal anesthetics, the Erythrocin line of antibiotics, and Ausria and Auszyme diagnostic kits for hepatitis B (the first US-licensed AIDS virus antibody detection kit), Similac and Isomil infant formula, the TDx drug detection system, and the ADD-Vantage drug delivery system. Abbott's commitment to the future is evident in its \$500 million spent on research and development in 1989 and an annual compound growth rate in R&D spending over the past five years of 20%.

Alliance Pharmaceutical Corporation

Alliance Pharmaceutical Corporation is a research and development company focused on transforming innovative scientific discoveries into therapeutic and diagnostic agents.

Oxygent is in clinical development in conjunction with Johnson & Johnson as an oxygen carrier ("blood substitute") to reduce the need for donor blood transfusions during surgery.

LiquiVent is an intrapulmonary agent for treatment of acute respiratory failure. LiquiVent has Subpart E ("fast track") FDA status and is in clinical trials with neonates, children, and adults.

Imagent US is in preclinical development for enhancement of ultrasound images of blood flow abnormalities related to myocardial infarctions, blood clots, or solid tumors.

American Medical Association

The American Medical Association promotes the art and science of medicine and the betterment of public health. The AMA accomplishes this mission by advancing standards of medical education, promoting support for biomedical research, representing the medical profession, providing information about medical matters, and upholding professional conduct and performance.

Amgen, Inc.

Amgen, Inc., the largest independent biotechnology company in the world, is headquartered in Thousand Oaks, CA. Amgen

is a global biotechnology company that discovers, develops, manufactures, and markets human therapeutics based on advanced cellular and molecular biology. Amgen's four areas of research are hematopoiesis, neurobiology, inflammation/autoimmunity, and soft tissue repair and regeneration.

Amgen has developed several human bio-pharmaceutical products using proprietary recombinant DNA technology. Amgen currently markets two products: EPOGEN® (Epoetin alfa), used to treat anemia associated with chronic renal failure for dialysis patients in the US and China and NEUPOGEN® (Filgrastim), used worldwide to decrease the incidence of infection associated with some forms of chemotherapy.

Axon Instruments, Inc.

Axon Instruments, Inc. designs and manufactures instruments and software for electrophysiology. Axon Instruments produces full-featured amplifiers for single-channel and whole-cell patch clamp and for single- and two-electrode current/voltage clamp applications. These hardware products are supported with PC and Macintosh software and acquisition hardware for the acquisition and analysis of biophysical data. The latest products are the CyberAmp series of general-purpose analog signal conditioners. They provide up to eight channels of computer-controlled adjustment of gain, offset, and low-pass Bessel filtering. Virtually any type of transducer can be adapted for the CyberAmp. The computer can instantly determine the scaling and units of each transducer. Support for the CyberAmps is provided by software from Axon Instruments and others. The CyberAmp used in conjunction with Axotape software and TL-1-125 acquisition hardware makes a complete computer-based chart recorder system.

Berlex Biosciences

Berlex Biosciences is a US subsidiary of the multinational pharmaceutical and chemical firm Schering AG West Germany (not connected with Schering-Plough Corp. or Schering Corp. of New Jersey). It conducts research and markets prescription drug products primarily for cardiovascular, diagnostic imaging, metabolic, endocrine, and central nervous system uses.

Sustaining Associates

Genentech, Inc.

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

Grass Foundation

The Grass Foundation underwrites the annual Walter B. Cannon Lectureship given at the spring meeting of the American Physiological Society. The naming of this lectureship serves two functions: to commemorate the enormous contribution of Cannon to the growth of knowledge of physiology and to pay a tribute to Cannon on behalf of many of the founding trustees of the Grass Foundation who were members of his research group at Harvard Medical School early in their careers.

This lectureship is in accordance with the Grass Foundation's charter mandate to support research and education in neurophysiology. Other programs include funding for other annual and visiting lectureships, summer fellowship support for young students, and occasional relevant course support.

Harvard Apparatus

Harvard Apparatus, since its inception in 1904 at the Harvard Medical School, continues to design, develop, and supply the unique apparatus that has shaped the development of teaching and research in physiology and allied science, including syringe peristaltic and respiration pumps, recording systems, and research accessories.

Jandel Scientific

Jandel Scientific designs and sells IBM-compatible software for scientific research. Products include Sigma-Plot for publication-quality scientific graphs (with automatic error bars, regression lines, and many other scientific graphing options); Sigma-scan for *x-y* digitizing, morphometric measurement, and analysis; and PC3D for generating three-dimensional reconstructions of objects from serial sections. JAVA, the latest product, is a video analysis system capable of image processing, densitometry, automatic object counting and edge tracking, and morphometric measurement. JAVA works with a video digitizing board and input from a video camera, VCR, or other video source.

Janssen Research Foundation

Janssen Pharmaceutica was founded in Belgium in 1953 by Paul Janssen. It is now an international company built on the foundation of research and a bedrock of innovation. The company remains under the direction of Janssen and has an unparalleled record in the successful development and marketing of new pharmaceutical products. According to the Japan Drug Research studies, Janssen was responsible for more significant new drug discoveries during the period 1970-1983 than any pharmaceutical company in the world.

The company currently has approximately 6,000 employees world-wide. It is a world leader in medication used in the treatment of allergies, mental disorders, digestive and intestinal problems, cardiovascular conditions, and worm and fungal infections. Janssen's compounds have also enabled major advances in anesthesia and immunology. In addition, Janssen has also discovered many chemical compounds to identify and characterize receptors in the brain and the periphery that have played a prominent role in advancing our knowledge about neurotransmitters.

Eli Lilly and Company

The Lilly Research Laboratories is dedicated to the advancement of basic scientific information upon which further targeted medical breakthroughs may be identified. Scientists in the Lilly Research Laboratories are committed to excellence in research as evidenced by a steadily increasing investment in research and development over the years. Scientific research is being supported by the construction of new research facilities and with the use of a Cray II supercomputer. Scientists are focusing on basic research and targeted medical therapy for cardiovascular disease, central nervous system dysfunction, cancer, diabetes, and pulmonary disorders.

Pharmacia and Upjohn, Inc.

Human health care is at the heart of Pharmacia and Upjohn's endeavors. Pharmacia and Upjohn, Inc., a multinational corporation and one of the largest research-based pharmaceutical manufacturers in the world, has research, production, and warehousing facilities in more than 45 countries, and its products are sold in more than 150 countries.

Some of Pharmacia and Upjohn's most promising research has been in the fields of oncology, peptide hormones, cataract surgery, nutrition, and allergy diagnostics.

Sustaining Associates

Procter & Gamble Company

Procter & Gamble Company is a multinational consumer products and health care company committed to world-class research and product development. It has major technical centers in Cincinnati, Ohio; Norwich, New York; Hunt Valley, Maryland; Mexico City, Mexico; Caracas, Venezuela; Brussels, Belgium; Egham and Newcastle, UK; and Kobe, Japan.

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

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

Quaker Oats Company

The Quaker Oats Company is a leading consumer products company marketing both human and pet food products around the world. The development of new food and beverage products and the refinement of existing Quaker products occurs in the laboratories of Quaker's Research and Development facility in Barrington, Illinois. Quaker food scientists, nutritionists, biochemists, and physiologists devote their energies to making certain that Quaker products meet the high standards consumers expect of The Quaker Oats Company.

Rhone-Poulenc Rorer

An international company dedicated to health, RPR is the first pharmaceutical company in France, the third in Europe, with a turnover in 1994 of US\$4.5 billion: a research-driven company with 14 percent re-invested in Research and Development and 3,000 employees in R&D. With research centers located in France, the US, and the UK Research and Development is focused on seven main therapeutic areas: Oncology; Cardiovascular diseases; Infectious diseases/AIDS; Rheumatology/Bone metabolism; Central nervous system disorders; Respiratory diseases/Allergies; and Plasma proteins. To invest in new technologies and gene and cell therapies is RPR's commitment to the future.

Schering-Plough Research Institute

Born out of a 1971 consolidation of two companies (Plough, Inc. and the Schering Corporation), Schering-Plough Research Institute is dedicated to the discovery, development, and marketing of novel therapeutic entities. The company focused its research in the fields of anti-inflammatory, antiallergic, cardiovascular, and anti-infective disorders. The company has also attained a leading position in immunology and recombinant DNA technology.

G.D. Searle and Company

The physiologic and scientific directions of G.D. Searle and Company are primarily in areas related to arthritis and inflammation, cardiovascular disease, and oncology with an emphasis on adjunctive therapy and opportunistic infections. In these three major therapeutic areas, the emphasis is on defining new molecular targets that are likely to elicit a dramatic shift in therapeutic efficacy with a true ultimate enhancement of therapeutic benefit.

Research employs high throughput robotic screening to define chemical or protein leads, medicinal chemistry and protein biochemistry, including protein mutagenesis, to maximize the properties of the chemical or protein lead, and extensive animal testing to determine proof of concept. Molecular and cell biology are utilized extensively to support screening efforts and to define the molecular targets underlying a particular disease, including the use of differential display PCR. The approach is to integrate expertise across scientific disciplines to rapidly determine proof of concept underlying a disease target.

SmithKline Beecham

SmithKline Beecham is one of the world's leading health care companies. Its principal activities are the discovery, development, and marketing of both human and animal pharmaceuticals, over-the-counter (OTC) medicines, health-related consumer brands, and clinical laboratory testing services. ❖

News From Senior Physiologists

Letters to Harold S. Weiss

Charles G. Wilber writes: “My status at Colorado State University is Professor and Chairman Emeritus of Zoology. The university has seen fit to include with my title a small but adequate office, a small adjacent laboratory, and reasonable coverage of expenses, e.g., mailings, photocopy service, stationery, etc. My retirement was mandatory when I reached age 70. As retired, I have been representing retirees on the University Faculty Benefits Committee. We no longer have a mandatory retirement age at CSU.

“I still serve on a limited number of MS and PhD graduate committees. Obviously for rational reasons I do not direct the overall program of any graduate student. Over the years I became involved in the legal aspects of the biomedical sciences. This ended up in my being a Fellow of the American Academy of Forensic Sciences. A prominent amount of my later research and writing involved problems in forensic science.

“The influence of that orientation had me publishing papers in the forensic science media. Indeed, for ten years (ending two years ago) I was on the board of editors of the *American Journal of Forensic Medicine and Pathology*. It is intriguing how much applied physiology can be used to answer problems of a forensic nature. My later publications have had that tendency.

“For example, a former Denver police officer was accused of a Sunday morning murder of six bank guards and the garnering of nearly \$500,000 in loot. I served as an expert witness for the defense. I was able to work out the weight and cubage of all the material — money, guards’ radios, etc. — that had to have been taken out of the bank by the accused and transported to his home miles to the west in one hour. Impossible. Moreover, the chemical composition of the bullets taken from the victims’ bodies was drastically different than that of the bullet stock that the

police declared the shooter had used. Not guilty.

“Many cases of homicide and suicide get confused. I have been able to apply physiological and anatomical information to clarify just what had to be concluded.

“In the summer my wife and I journey to Woods Hole, MA, where our summer home has been located since 1949. In the summer I do extensive reading and writing at the Marine Biological Laboratory. It is a grand place for meeting colleagues from around the world.

“I should mention that I was among that unique crew of aviation physiologists who served in World War II to train Air Corps pilots and crews in the challenges of high-altitude flying. I remained in the active reserve primarily in research or as a biomedical staff officer. Most of my postwar active duty time was at the Armed Forces Institute of Pathology in Washington. I retired as a Colonel, USAF, after 35 years service.

I must comment that in the application of our scientific knowledge to the real world around us, we are rather primitive. The fact that shortly in our country the fastest-growing segment of our population will be in the 80+ age group seems to have no impact on planners, let alone politicians. How long can we afford as a society to have in a “retired” status men and women who can work — so as not to be in a position to have social security — and be in a position to pay taxes?”

David M. Travis writes: “I am living in Woods Hole, MA, where I have had a home for many years. After leaving positions in Medicine and Pharmacology in 1991, I came to Massachusetts to look after long time interests in the state. I worked for several years at a Worcester clinic and saw patients four days a week.

“Now I am fully retired. I go to occasional meetings and enjoy a retreat in New Hampshire.”

Garth J. Thomas writes: “Alas, I am no longer researching and teaching, although I go to my office in the Neurology and Anatomy Department at the University of Rochester Medical Center almost every day to read and to use the library to continue my interest by keeping up (more or less) in the area of the neuro-physiological and anatomical mechanisms subserving the behavioral capacity of memory.

“Before I had to give up research, I was investigating memory impairments in rats that had sustained global cerebral ischemia. If the ischemia were induced correctly and for the proper duration (about five minutes), the CA1 layer of the pyramidal cells in the hippocampi of the rats was essentially obliterated three days after ischemia-induction. There was very little (or no) damage to other brain areas and no obvious impairments of behavior. However, *mirable dictu*, a special and restrictive form of the memory of the rats, was wiped out. Very similar effects have since been found to be true for other “higher” mammals such as monkeys and *Homo sapiens*!

“I enjoy keeping up with much of the modern research that delineates the detailed ins and outs of that phenomenon!

“Again, thank you and APS for noting my approaching birthday and interest in my activities. They are not much of a contribution, but they are fun!”

Robert J. White writes: “I was delighted to hear from you. I had forgotten for a moment that I had reached such a senior status. I am still active in neurosurgical practice and teaching, but my research has come down to that of a clinical variety having to do with head injury.”

Clara M. Szego writes: “I have continued to write and consult. Most recently I presented a review of hormone action at the molecular and cellular level, which represented a summary of my keynote lecture at an international sym-

News From Senior Physiologists

posium mounted by the Reproductive Sciences Branch, National Institute of Child Health and Human Development on endocrine regulation of the cytoskeleton in target cells (published in *Endocrine Two*: 1079-1093, 1994). I contribute occasional evaluations of grant applications from here and abroad. I also serve as contributing editor of the *UCLA Emeriti Newsletter* with emphasis on profiles of prospective speakers.

"Other activities include publication of some of my poetry in small and medium-sized literary journals and in anthologies under the pseudonym, Marian Steele. Garden, piano, and providing (I hope) a happy environment for my loving husband, **Sidney Roberts** — who, like me, is a long-time member of the American Physiological Society (1945!) — keep me very much involved. I have not found time for the proverbial leisure that I was supposed to enjoy in "retirement." But I do hope to do a bit of lolling by the pool this summer."

Letters to Eugene M. Renkin

Martin Lipkin writes: "Thank you very much for your kind and thoughtful letter sent on my 70th birthday. The American Physiological Society was the first professional society of which I became a member, and although I have joined many others since then, I have not received a nice letter of this type from any other organization.

"The first paper that I presented at a meeting was given at an annual meeting of the American Physiological Society. This was due to the good fortune of working with Jim Hardy, who, as you recall, was at Cornell and subsequently became head of the Pierce Foundation at Yale. The fortunate circumstance of working with Jim led to my joining the Department of Medicine at Cornell, where I have been since with a long period at Memorial Sloan-Kettering, which is affiliated with Cornell. I just

recently moved to another component of Cornell, the Strang Cancer Prevention Center, where I am very active in the development of a new cancer chemoprevention program involving several departments at Cornell, Rockefeller University, Memorial Sloan-Kettering, and Columbia University.

"Thus, somewhat to my surprise, it appears that I am still quite active, publish several papers each year with colleagues, and regularly plan and participate in meetings here and abroad. I would like to thank you again for your very thoughtful inquiry, and I look forward to the opportunity of continuing activities and my association with the American Physiological Society."

Benjamin Libet writes: "Thanks much for your greetings on my 80th birthday. It's nice to be remembered by the American Physiological Society.

"Yes, I am still active professionally, though in a more limited way than I was several years ago. There has been in recent years an enormous rise of interest in the questions of how brain and mind are related — especially for consciousness, that is conscious subjective experience. This has led to a greatly increased interest in our unique experimental work in this area (from about 1958-1991). We had taken a direct approach to causative relations between cerebral physiology and conscious experience, as studied in human subjects with intra- and extra-cranial stimulation and recording.

"I continue to be invited to lecture on our contributions to this field in symposia, international congresses, and in individual university settings. I am presently due to speak in a symposium on "What is Consciousness" to be held in Paris in the French Senate! Also, to give a plenary lecture for the International Congress of Psychophysicologists in Tampere, Finland, and to give lectures for the Instituto di Cibernetica in Naples, Italy. Then there are numerous requests for review papers by me. I have also published a rather radical paper

that proposes a testable theory for a conscious mental field (*J. Consciousness Studies*, 1994).

"All this increased attention to our work and the stimulus to further writings has been very gratifying, coming during my "retirement" years. I produced a technical book on our work (*Neurophysiology of Consciousness*, 1993, Birkhauser-Boston), and I am hoping to write a book for a general audience. I would even like to carry out an experimental test of my hypothesis that conscious and unconscious mental functions can be developed in the same cerebral areas, but my physical abilities may not be up to that."

Giacomo Meschia writes: "I am happy to report that I am working full-time doing research, teaching respiratory physiology to medical students and training young investigators in placental and fetal physiology. I plan to stop formal teaching in 1998 and then to continue my research on a part-time basis. With the help of wonderful collaborators and technical assistants, I am still able to perform good quality research and publish in respectable journals."

Letters to Richard L. Malvin

Irwin M. Arias writes: "By your definition I'm a "senior physiologist in wolf's clothing" (i.e., still holding down a Chairmanship, grants, go-go, etc.)"

David H. Hubel writes: "I was born in Windsor, Ontario, of American parents and was brought up in Montreal from the age of three. I graduated from McGill University in 1947 with a BSc in Mathematics and Physics then went on to McGill Medical School, where I received an MD degree in 1951. I did a rotating internship at the Montreal General Hospital followed by a year's residency in neurology and a year in clinical neurophysiology at the Montreal Neurological Institute. After a final year of neurology residency at the Johns

News From Senior Physiologists

Hopkins Hospital, I entered the US Army and spent three years at the Walter Reed Army Institute of Research; it was there that I began my research on central-nervous mechanisms of vision. In 1958 I began a collaboration with Torsten Wiesel, first at Johns Hopkins and then at Harvard Medical School, where I have been ever since. I am now John Enders University Professor of Neurobiology. In 1981 I shared the Nobel Prize in Physiology or Medicine with Torsten Wiesel and Roger Sperry.

“My work has all been done in collaboration: from 1958 to 1982 with Torsten Wiesel and since then with Margaret Livingstone. Our interest has been in learning how the brain handles the information it receives from the eyes and in learning about the ways in which the circuits for vision can be modified after birth by visual experience. The studies have involved recording electrical nerve signals in animals, mainly cats and monkeys. The work on postnatal development has led to a means of preventing one of the most common forms of human blindness. At present our work is centered on determining the brain mechanisms that subserve the perception of form, movement, color, and depth.”

Olga Hudlicka writes: “I am much busier than ever before. The reason is that I spend four to five months in a year outside Birmingham, and I am trying — unfortunately, not very successfully — to do most of the work I used to do in 11 months before my retirement in the remaining time.

“To answer your question what I am doing: I give some tutorials to medical students. I supervise one PhD student and one surgeon who is working on his MD in my lab. For the past academic year I did experiments with a visiting professor from the US, spent three weeks doing experiments with my colleagues in Italy, and had another visitor

from the US with whom we have a long-standing collaboration and a joint grant.

“The reason why I spend so much time outside of Birmingham is partly because I go various meetings both in the UK and other locations abroad. Tomorrow I am leaving for five weeks in New Zealand and Australia to take part in a meeting on Exercise. I am adding to the trip a week in Tahiti and two weeks in the US to visit my son’s family and to see my two grandsons. I usually have my 10-year-old granddaughter, who lives in London, staying with me for at least part of her holidays, and I try to see my grandsons three to four times a year. (Last February we went skiing in Switzerland.)

“I try to write papers on the material left with me by my previous students, and I write various reviews. Unfortunately I do not write enough. In April I was elected as president of the British Microcirculation Society for three years; the members obviously have great faith in my capabilities to remain active, so I shall try my best not to disappoint them.

“Words of wisdom to pass to younger colleagues? Do not get discouraged by a lack of funding. One can do a lot of good work with a minimum of money at least for a limited period of time, and hard work and perseverance is eventually rewarded.”

Letter to John R. Blinks

Anwar A. Hakim writes: “I am trying to stay informed of the strong currents in physiological sciences, especially the molecular and cellular aspects of physiology, so that I may complete my book entitled *My Personal Concept of the Breast Cancer Cell*.

“The initial natural force which was created in me at birth was and still is physics, i.e., atomic physics with its integration into electrical impulses. This field, however, had no practical

application to earn a living in the country of my birth, my having been born to a middle-class Syrian family. My career began in an uncoordinated academic environment with a mixture of courses that ranged from history of philosophy, accounting, and the nature and history of creation to courses in geology and botany. I progressed into medicine: biochemistry, pharmacology, pathology, and human anatomy. I branched into chemistry (analytical, industrial, and clinical) and physics (atomic physics, electricity, and electrical engineering.) This occupied two decades of my life. It produced many academic degrees and the country’s license.

“I am indebted to my father, A.G. Hakim, and my aunt, Hanifa Hakim, who patiently supported my education financially without knowing what I was doing and what my aims were. At the time I did not know which discipline I would follow. An outside force drew me away from the easy, comfortable, and secure environment of my birth to enter the world of molecular/cellular physiology. Those who directed me into scientific research were my physics instructor, Janina Bejunska; M.W.F. Mommearts, a lecturer of Physiology I encountered at the American University of Beirut; and Adolf Butenandt of the Max-Planck Institut in Munchen.

“I started with the microorganism *E. coli*, followed by mammalian cells (the human breast cancer cell), and searched the transfer of high energy phosphate from one molecule to another to modulate and signal a physiological response. I researched the changes in the nucleic acids fractions during tryptophan-tryptophanase adaptation and the phospholipids of the breast cancer cell. This subject continued to the present. These activities have been detailed in more than 350 scientific reports published in national and international peer-reviewed journals. ♦

People and Places

Klabunde Appointed Director of Deborah Research Institute

Richard E. Klabunde has been appointed Director of the Deborah Research Institute, according to Sergius B. Gambal, Chairman of the Board of Directors of the Institute.

Klabunde previously held the position of Associate Director of the Institute from 1993 to 1995. Since coming to Deborah, Klabunde has established a microcirculatory laboratory, brought many new experimental models to the Research Institute, and implemented computerized data acquisition and information exchange.

Prior to joining the Deborah Research Institute, he served as Senior Cardiovascular Group Leader and Volwiler Associate Research Fellow in the Department of Pharmacology at Abbott Laboratories, North Chicago, IL. He also

served as an Adjunct Associate Professor, Department of Physiology at The Chicago Medical School, and Adjunct Professor of Biomedical Sciences at the University of Illinois College of Medicine at Rockford, IL.

His current research interests include: mechanisms of septic shock, regulation of cardiac function, ischemia and reperfusion injury, and inflammatory responses in the microcirculation. Klabunde has been the recipient of numerous grants and has published and presented extensively.

Klabunde holds a doctorate in physiology from the University of Arizona, Tucson, and received his Bachelor of Science from Pepperdine University, Los Angeles, CA. He is a member of the American Physiological Society,

Microcirculatory Society, and American Heart Association.

Deborah Research Institute is a private, nonprofit research organization located on the 60-acre complex which comprises Deborah Heart and Lung Center and Deborah Hospital Foundation. Basic and clinical research is conducted at the 15,000 square-foot state-of-the-art facility. The Institute employs a full-time staff of research scientists, laboratory technicians, and support personnel. The Institute is supported by the Deborah Hospital Foundation, a nonprofit organization, which raises millions of dollars each year on behalf of the Institute and the Deborah Heart and Lung Center, a 161-bed specialty teaching hospital. ♦

Greenwood Named to National Science Board

President Clinton in early August announced the appointment of **M.R.C. Greenwood** to a six-year term on the National Science Board, which is the advisory council for the National Science Foundation. Greenwood, the former Associate Director for Science of the White House Office of Science and Technology Policy, is an APS member.

Her area of expertise is physiology and nutrition.

The 24 members of the prestigious National Science Board (NSB) are drawn from both academia and industry, and they represent a range of science and engineering disciplines. Members of the NSB recommend national policies for promoting basic

research and education in the sciences to the NSF.

After serving at OSTP from November 1993 to May 1995, Greenwood became the Chancellor of the University of California at Santa Cruz. She is a member of the Institute of Medicine. ♦



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People and Places

Beth A. Bailey, formerly of the Department of Physiology, Temple University School of Medicine, Philadelphia, PA, has accepted a new position with the Department of Biology, Neumann College, Aston, PA.

Having accepted a new assignment, **David M. Baldwin** is now with the Department of OB/GYN, University of Nebraska Medical Center, Omaha, NE. Baldwin was formerly with the Department of OB/GYN, Texas Tech University Health Science Center, Odessa, TX.

Henry Brown recently accepted a position with the Division of Plastic Surgery, Brigham and Women's Hospital, Boston, MA. Prior to his new appointment, Brown was associated with the Harvard Surgical Services, New England Deaconess Hospital, Boston, MA.

Moving from the Department of Pharmacology, University of Texas Southwestern Medical Center, Dallas, TX, **Mark L. Burleson** has joined the Department of Biology, University of Texas, Arlington, TX.

Xiao Ling Chen is now affiliated with the Department of General Surgery of the University of Arkansas for Medical Sciences, Little Rock, AR. Previously, Chen was with the Division of Biochemical Toxicology, National Center Toxicology Research, Jefferson, AR.

Raymond T.F. Cheung has joined the Department of Medicine, University of Hong Kong, Queen Mary Hospital, Pokfulam, Hong Kong. Prior to moving to Hong Kong, Cheung was with the Robarts Research Institute, London, Ontario, Canada.

Accepting a new position with the Andrus Gerontology Center, University of Southern California, Los Angeles, CA, **Kelvin J.A. Davies** has moved from the Department of Biochemistry and Molecular Biology, Albany Medical College, Albany, NY.

Previously affiliated with the Department of Nephrology, Johns Hopkins Medical School, Baltimore, MD, **Oliver J. Devuyst** has recently relocated to the Division of Nephrology, St. Luc Hospital, University of Louvain Medical School, Brussels, Belgium.

Dariush Elahi has left the Geriatrics Service, VA Medical Center, Baltimore, MD, and has accepted a position with Massachusetts General Hospital Beacon Hill, Geriatrics Health Practice, Boston, MA.

Having joined the Brigham & Women's Hospital, the Department of Anesthesia, Boston, MA, **Massimo Ferrigno** has left the Department of Anesthesiology, University of South Alabama, Mobile, AL.

Formerly affiliated with the University of Chicago, Department of Medical Cardiology, Chicago, IL, **Lincoln E. Ford** is currently with the Department of Cardiology, VA Medical Center, Indianapolis, IN.

John Bernard Gordon has moved from the Department of Pediatrics, University of Maryland, Baltimore, MD, to the Childrens Hospital of Wisconsin Critical Care Section, Milwaukee, WI.

Previously associated with the Division of Neurology, University of Munich, **Roman Haberl** is now affiliated with the Department of Neurology at Staedtisches, Krankenhaus Munchen-Haslach, Munich, Germany.

Patricia A. Halpin recently accepted a position with the Department of Physiology, Dartmouth Medical School, Hanover, NH. Prior to her new position, Halpin was affiliated with the University of Connecticut, Storrs, CT.

Having left the Division of Human Immunology, Hanson Centre, Adelaide, Australia, **Per Ole Iversen** has joined the Department of Physiology, Institute of Basic Medical Sciences, University of Oslo, Oslo, Norway.

Accepting an assignment at the Cardiovascular Division, Harvard Medical School, New England Region Primate Research Center, Southborough, MA, **Weigun Shen** has left his former position with the Department of Physiology, New York Medical College, Valhalla, NY.

Formerly holding a position with the Department of Kinesiology, University of Waterloo, Waterloo, Ontario, **J. Kevin Shoemaker** has recently accepted a position with the Division of Cardiology, Hershey Medical Center, Hershey, PA.

David E. Stec has recently joined the Department of Internal Medicine, University of Iowa, Iowa City, IA. Formerly, Stec was with the Department of Physiology, Medical College of Wisconsin, Milwaukee, WI.

Steven Swoap has a new position with the Department of Biology, Williams College, Williams Town, MA. Swoap was formerly affiliated with the Department of Internal Medicine, Division of Cardiology, University of Texas Southwestern, Dallas, TX.

Having accepted a position with the Department of Math and Science, Friends University, Wichita, KS, **Karyn M. Todd-Turla** has left the Department of Physiology, Dartmouth Medical School, Lebanon, NH.

B. Stanley Willenbring has moved from the Department of Pharmacology and Physiology, Oklahoma State University, Tulsa, OK. Willenbring has accepted a position with the School of Health Sciences, College of West Virginia, Beckley, WV.

Recently, **Zhenpeng Zhuang** joined The Whitney Laboratory, University of Florida, St. Augustine, FL. Zhuang was formerly with the Department of Zoology, University of Hawaii at Manoa, Honolulu, HI. ♦

Book Reviews

Imitation in Human and Animal Behavior

Wanda Wyrwicka

New Brunswick, NJ: Transaction Publishers, 1996, 101 pp., illus., index, \$29.95.

ISBN: 1-56000-246-8

Wanda Wyrwicka was one of a group of talented young people who studied Pavlovian conditioning with the late Prof. Jerzy Konorski. Their behavioral and physiological work at the Nencki Institute made Warsaw a Mecca for Pavlovian researchers. Few other laboratories in eastern Europe achieved such eminence. But Konorski's death, political change, and emigration brought an end to that era. Now at UCLA, Wyrwicka has turned her attention to more complex learning processes. It is not clear, however, that she always recognizes their complexity, and her book is often, although not always, disappointing.

Movement imitation is often defined as "the copying of a novel or otherwise improbable act ... for which there is clearly no instinctive tendency" (9). For more than a century, most serious researchers have sought to distinguish such "true imitation" from simpler processes that sometimes resemble it (see Refs. 1, 4, 5, 8, 9). At least ten such simpler processes have been identified over the years, including audience effects, behavioral contagion, circular reactions, environmental aftereffects of a model's performance, local enhancement, maturation, observational conditioning, Pavlovian conditioning, percussive mimicry, and various artifacts of following (1, 4). While these simpler processes occur in many species, true imitation is far less common. Thus, a recent review by the present author (4) concluded that imitation had been documented in just three non-human groups: great apes (2, 6), cetaceans (7), and parrots (4).

While not all authorities would

agree with every detail of Moore's (4) conclusions, Wyrwicka is almost unique in citing none of the above works, while freely attributing imitation to many other creatures, including cats, rats, and newly hatched chicks. The reason for her unique view is that she dismisses both Thorpe's (9) definition and a century of careful analysis and accepts almost all forms of social learning as imitation.

Within reason one should be tolerant of both "lumpers" and "splitters." But when the lumping becomes so extreme that it discards a hundred years of close analysis and even blurs the line between young chicks and adult humans, then one might ask for at least a highly informed and carefully reasoned explanation. But, alas, that is not forthcoming; we are simply assured that the author's lumping is "most informative and comprehensive" (p. 81). Having thus lumped eleven processes together, she goes on to attribute them all to "the unconditioned reflex of imitation" (p. 84, italics in original). Clearly, this imitates the wrong side of Pavlov.

While much of the book is disappointing, two chapters—those describing her own work—are both interesting and informative. Chapters seven and eight show that "imitation" [read: observational conditioning] can produce long-term changes in food preferences, even to the point of inducing cats to eat quite unnatural foods. Wyrwicka began by using hypothalamic stimulation to condition mother cats to consume unlikely substances. Their kittens observed them. This observation caused the kittens to treat the same substances as food. Thus, they acquired long-term preferences for bananas, potatoes, and even quinine-laced agar jelly. Wyrwicka cites still stranger cross-species effects, in which deer and giraffes housed with pelicans sometimes ate fish (Y. Kawamura, unpublished observations). A striking photograph of such behavior is reprinted

This book is attractive, well pro-

duced, and moderately priced. Chapters seven and eight may justify the cost. But, despite its title, it describes not a single example of imitation in any nonhuman animal. Readers interested in that process might do better to examine Heyes and Galef's *Social Learning in Animals* (3) ♦

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Bruce R. Moore
Dalhousie University

Book Reviews

Crib Death

Warren G. Guntheroth
Armonk, NY: Futura Company, Inc.,
1995, 439 pp., illus., index, \$72.00.
ISBN: 0-87993-618-5.

Sudden infant death syndrome, also known as SIDS and crib death, is defined as the sudden and unexpected death of an infant that is unexplained after obtaining a careful history, performing a death scene investigation, and completing a thorough postmortem examination. Though described in the Bible, until recently SIDS has remained an enigma. It has been 10 years since the first study was published by Beal et al of Australia, identifying prone positioning and overheating as risk factors for SIDS. Over the next five years several studies were published in Australia, New Zealand, and England among other countries identifying modifiable risk factors that correlated with SIDS risk. Subsequently, aggressive public service programs were initiated in these countries educating parents to place their babies on their backs or sides to sleep, to avoid cigarette smoking and overheating, and to breast feed their infants. The strong adherence to these recommendations and the decrease in SIDS deaths by up to 90% in those countries has been remarkable. Despite the recommendation by the American Academy of Pediatrics in 1992 and the beginning of the Back to Sleep Campaign in 1994, the incidence of and adherence to these recommendations in the US has not been as high as anticipated and the decrease in SIDS not as substantial as in other countries, nor necessarily linked to changes in infant care practice. It is therefore timely for Guntheroth to publish the third edition of his book *Crib Death* at a time when actual progress is being made on the international scene with regard to SIDS incidence (the second edition was published in 1989).

Guntheroth has organized his book into nine chapters including introduction and history of crib death; pathology of SIDS; epidemiology; pathophysiology of infants at risk for SIDS; final pathways: theories of cardiovascular causes of SIDS; final pathways: apnea, identification and management of infants at risk for SIDS; clinical management of SIDS; and politics, research, and prevention. Each chapter is thoroughly referenced with an exhaustive bibliography of publications pertinent to SIDS. Each chapter is carefully organized and a brief summary of all cited publications is provided to state or clarify each point, with a historical perspective. However, Guntheroth has not provided the reader with a scientific analysis of these publications. Rather, he has provided a commentary that is more opinion than scientific critique. Often the comments are interjected with personal experience or citation of work from Guntheroth's lab. There is also a strong thread of criticism/assignment of blame for the delay in a powerful US public health campaign to increase awareness of known modifiable SIDS risk factors. As a result of the exhaustive reference list, the emphasis on the entire history of SIDS as it relates to the contents of each chapter, and the sense of non-objective criticism, the reader loses sight of the recent exciting SIDS data. Therefore, this book serves an important role as a reference book but still necessitates critical review of each and every pertinent original publication by the reader in order to assure a careful understanding of the subject. This is not a time to try to fit the published data into preexisting hypotheses. Instead, it is the time to carefully assess existing data and determine new avenues of study testing creative new hypotheses. Only then will SIDS move from the enigma category to the understood category. ♦

Debra E. Weese-Mayer
Rush Children's Hospital at Rush-
Presbyterian-St. Luke's Medical Center

Books Received

Application of Magnetic Resonance to the Study of Lung. Antonio G. Cuttillo (Editor). Armonk, NY: Futura, 1996, 607 pp., illus., index, \$98.00. ISBN: 0-87993-611-8.

Amyotrophic Lateral Sclerosis: Diagnosis and Management for the Clinician. Jerry M. Belsh and Philip L. Schiffman (Editors). Armonk, NY: Futura, 1996, 390 pp., illus., index, \$90.00. ISBN: 0-87993-628-2.

Biological Effects of Magnetic and Electromagnetic Fields. Shoogo Ueno (Editor). New York, NY: Plenum, 1996, 243 pp., illus., index, \$79.50. ISBN: 0-306-45292-8.

Carbon Dioxide, Populations, and Communities. Christian Körner and Fakbri A. Bazzaz (Editors). San Diego, CA: Academic, 1996, 465 pp., illus., index, \$84.95. ISBN: 0-12-420870-3.

Challenges and Perspectives in Neuroscience. D. Ottoson, T. Bartfai, T. Hökfelt, and K. Fuxe (Editors). Oxford, UK: Elsevier Science, 1995, 300 pp., illus., index, \$120.00. ISBN: 0-08-042515-1.

Essential Endocrinology. Third Edition. John Laycock and Peter Wise. New York: Oxford University Press, 1996, 409 pp., illus., index, \$34.95. ISBN: 0-19-262471-7.

Molecular Biology of Membrane Transport Disorders. Stanley G. Schultz, Thomas E. Andreoli, Arthur M. Brown, Douglas M. Fambrough, Joseph F. Hoffman, and Michael J. Welsh (Editors). New York: Plenum, 1996, 681 pp., illus., index, \$149.50. ISBN: 0-306-45164-6.

Physiology of Respiration. Michael P. Hlastala and Albert J. Berger. New York: Oxford University Press, 1996, 306 pp., illus., index, \$49.95. ISBN: 0-19-504434-7.

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.

Recent Advances in Cellular and Molecular Aspects of Angiotensin Receptors. Mohan K. Raizada, M. Ian Phillips, and Colin Summers. (Editors). *Advances in Experimental Medicine and Biology*, Vol. 396. New York: Plenum, 1996, 270 pp., illus., index, \$85.00. ISBN: 0-306-45209-X.

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

Textbook of Endocrine Physiology. Third Edition. James E. Griffin and Sergio R. Ojeda (Editors). New York: Oxford University Press, 1996, 396 pp., illus., index, \$27.95. ISBN: 0-19-510755-1.

Vascular Endothelium: Responses to Injury. John D. Catravas, Allan D. Callow, and Una S. Ryan (Editors). New York: Plenum, 1996, 358 pp., illus., index, \$105.00. ISBN: 0-306-45282-0. ♦

Announcement

Postdoctoral and Senior Research Associateships

The National Research Council announces the 1997 Resident, Cooperative, and Postdoctoral Research Associateship Programs. The programs provide opportunities for PhD scientists and engineers of unusual promise.

Approximately 350 new full-time Associateships will be awarded on a competitive basis in 1997 for research in chemistry; earth and atmospheric sciences; engineering; applied sciences and computer science; life, medical, and behavioral sciences; mathematics; space and planetary sciences; and physics. Most of the programs are open to both US and non-US nationals and to both recent doctoral recipients and senior investigators.

Awards are made for one or two years, renewable for a maximum of

three years; senior applicants who have held the doctorate at least five years may request shorter periods. Annual stipends for recent PhD's for the 1997 program year range from \$30,000 to \$45,500, depending on the sponsoring laboratory, and will be appropriately higher for senior Associates.

Financial support is provided for allowable relocation expenses and for limited professional travel during duration of the award. The host laboratory provides the Associate with programmatic assistance including facilities, support services, necessary equipment, and travel necessary for the conduct of the approved research program.

Applications submitted directly to the National Research Council are accepted on a continuous basis through-

out the year. Those postmarked no later than January 15 will be reviewed in February, by April 15 in June, and by August 15 in October. Initial awards will be announced in March and April — July and November for the two later competitions — followed by awards to alternate candidates later.

Information on specific research opportunities and participating federal laboratories, as well as application materials, may be obtained from: National Research Council Associateship Programs (TJ 2114/D3), 2101 Constitution Avenue, NW, Washington, DC 20418. (fax: 202-334-2759; e-mail: rap@nas.edu; Internet: <http://www.nas.edu/rap/welcome.html>.) ♦

MAMMALIAN ORGAN SYSTEM PHYSIOLOGY POSTDOCTORAL FELLOWSHIP



**SPONSORED BY
THE AMERICAN PHYSIOLOGICAL SOCIETY**

CRITERIA:

- Project must use the tools of cellular and molecular biology in the setting of the whole animal.
- Identify a laboratory and sponsor under whose supervision a project in mammalian organ system physiology and molecular biology can be combined.

AWARD

- Two year annual stipend of \$30,000
- Trainee allowance of \$3,500

CONTACT:

APS Postdoctoral Program
The American Physiological Society
9650 Rockville Pike
Bethesda, MD 20814-3991
TEL: (301)530-7118
FAX: (301)571-8305
info@aps.faseb.org

DEADLINE:

January 15, 1997

This program has been designed to promote careers in mammalian organ system physiology.

Scientific Meetings and Congresses

1996

October 19

Regional Human Anatomy and Physiology Conference, Georgetown, DE. *Information:* Barbara Wiggins, Delaware Technical and Community College, PO Box 610, Route 18, Georgetown, DE 19947. Tel: 302-856-5400 ext. 217; e-mail: bwiggins@outland.dtc.edu.

October 20-24

Second World Congress on Alternatives and Animal Use in the Life Sciences, Utrecht, The Netherlands. *Information:* World Congress Alternatives 1996, FBU Congress Bureau, PO Box 80.125, 3508 TC Utrecht, The Netherlands. Tel: 31-30-53-5344/2728; fax: 31-30-53-3667; e-mail: l.donkers@pobox.ruu.nl.

October 23-27

12th Annual Meeting of the American Society for Gravitational and Space Biology, Charlotte, NC. *Information:* Donald R. Beem, AIBS, Special Science Programs, 1444 Eye Street, NW, Washington, DC 20005. Tel: 202-628-1500 ext. 250; e-mail: dbeem@aol.com.

October 28-30

Advances in Pediatric Nutrition, Baltimore, MD. *Information:* Program Coordinator, Office of Continuing Medical Education, Johns Hopkins University School of Medicine, Turner Building 20, 720 Rutland Ave., Baltimore, MD 21205-2195. Tel: 410-955-2959; fax: 410-955-0807; e-mail: rturner@som.adm.jhu.edu.

November 22

Neural Control of Circulation During Muscular Activity, Rome, Italy. *Information:* Jacopo Legramante, Università Degli Studi Di Roma Tor Vergata, Dipartimento di Medicina Interna, Cattedra Fisiopatologia Medica, Via della Ricerca Scientifica s.n.c.-00173 Rome, Italy. Tel: 7259-4218; fax: 7259-4263.

1997

February 18-22

10th International Hypoxia Symposium: Women at Altitude, Lake Louise, Alberta, Canada. *Information:* Sharon Studd, Faculty of Health Sciences, McMaster University, Room 1M7, 1200 Main Street West, Hamilton, Ontario, Canada L8N 3Z5. Tel: 905-525-9140; fax: 905-572-7099; e-mail: studd@fhs.csu.mcmaster.ca.

February 22-28

Medical Imaging '97, Newport Beach, CA. *Information:* SPIE, PO Box 10, Bellingham, WA 98227-0010. Tel: 360-676-3290; fax: 360-647-1445; e-mail: spie@spie.org.

March 2-6

41st Annual Meeting of the Biophysical Society, New Orleans, LA. *Information:* Emily M. Gray, Executive Director, Biophysical Society, 9650 Rockville Pike, Suite L-0512, Bethesda, MD 20814-3998. Tel: 301-530-7114; fax: 301-530-7133; e-mail: society@biophysics.faseb.org; internet: <http://www.tulane.edu/~biochem/biophys97/top.htm>.

March 2-7

Principles and Practices of Tracer Methodology in Metabolism, Galveston, TX. *Information:* Robert R. Wolfe, Metabolism Department, UTMB/Shriners Burns Institute, 815 Market Street, Galveston, TX 77550. Tel: 409-770-6605; fax: 409-770-6825.

April 10-11

Hypoxia and Reoxygenation: From Basic Science to Pediatric Cardiac Surgery, Glasgow, Scotland. *Information:* Michele Samaja, Department of Biomedical Sciences and Technology, University of Milan, 60, via Olgettina, Milan, Italy 20132. Fax: 39-2-264-23355; e-mail: samaja@itba.mi.cnr.it.

April 11-13

International Dermatology Symposium, Berlin, Germany. *Information:* Department of Dermatology, University Medical Center Benjamin Franklin, Free University of Berlin, Hindenburgdamm 20, D-12200 Berlin, Germany. Tel: 4930-8445-2808; fax: 4930-8445-4262.

May 16-18

5th International Congress on Physical Education and Sport, Komotini, Greece. *Information:* Savvas Tokmakidis, Department of Physical Education and Sport Science, Democritus University of Thrace, Komotini, 69100, Greece. Tel: 30-531-21764; fax: 30-531-33582.

June 2-6

24th Annual Meeting of the International Society for the Study of the Lumbar Spine, Singapore. *Information:* Edward Hanley, ISSLS, Sunnybrook Medical Centre, 2075 Bayview Avenue, Toronto, Canada M4N 3M5. Tel: 416-480-4833; fax: 416-480-6055.

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 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.

September 7-11

International Congress on Chronobiology, Paris, France. *Information:* Yvan Touitou, Service de Biochimie Médicale, 91 boulevard de l'Hôpital, 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.