

Sixty-Fourth President of APS

Norman C. Staub

Norman C. Staub was installed as the 64th President of the American Physiological Society at the close of the Society's spring membership meeting this month in Atlanta.

Staub is a professor of physiology and a senior staff member in the Cardiovascular Research Institute at the University of California, San Francisco. He succeeds Shu Chien, who is a professor of bioengineering at the University of California, San Diego. Staub is the sixth person from California to be elected president in the Society's 104 years, all in the last 30 years.

Staub has been an active member of APS since 1961, serving on a wide range of committees, including the committee on committees, membership, program, and education committees. He was chairman in 1976 of the Respiration Group, as it was called before sections were established, and later served as programmer on the Respiration Section's steering committee. Staub also was a member of the APS Council for seven years.

Perhaps his most significant achievement as a committee member was the development of Poster-Discussion sessions at meetings.

In looking forward toward the next century Staub believes education will be one of the most important areas of phys-

iology that needs to be developed. Individual physiologists already contribute to their local schools and APS has several initiatives in education, he notes, citing the new APS Ad-

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An Interview With The President

Norman Staub took a few minutes to give a glimpse of his views—past, present, and future—concerning physiology and the American Physiological Society.

What is your assessment as to where the discipline of physiology stands today and what is your vision as to where the discipline of physiology should be at the close of the decade of the 1990s?

"American physiology has changed since its inception from a predominantly basic animal orientation to more clinical physiology. In Europe, clinical physiology is a respected subdiscipline, but not in the United States. The American Physiological Society is a strong haven for clinical physiologists as about half of the membership are in clinical departments.

"I believe APS will continue to appeal to and evolve more toward clinical physiology and toward interdisciplinary physiology as more and more small specialty societies form. The change in the fall membership meeting to an interdisciplinary specialty meeting is a clear and present example."

What do you see as the critical issues (aside from research funding and animal issues) confronting the discipline of physiology between now and the year 2000?

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PRESIDENT

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vances in Physiology Education journal and the high school teachers' summer research program.

"If America is to have a scientifically literate citizenry that will support basic bench scientists', research at the local, state, and national levels," Staub said, "there is much that must be done." He wants the Society to take the leadership in education by participating in national forums of education and interacting with various science teachers organizations.

"During my year as president I will head a task force for the purpose of determining whether individual sections should be made the governing body of APS," Staub said, "I always have championed the rights of the individual member, and I will not support any change that dilutes the paramount position of the individual member.

He also noted that APS has the opportunity in the 1990s to bring a number of smaller societies into APS meetings, such as currently being done with the Microcirculatory Society and Bioengineering, and to sponsor new members in FASEB as it seeks to represent all of the American biological sciences on the national scene.

Staub currently is winding down a sabbatical leave at the Royal Post-

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graduate Medical School in London where he is specializing in the cell biology of macrophages. The sabbatical also has afforded him the opportunity to visit physiology departments throughout England and to meet with officials of The (British) Physiological Society, thus giving him insight into the English views as to the direction of science in general and physiology in particular.

Staub, who is a native of Syracuse, NY, earned a baccalaureate degree in 1950 from Syracuse University and received his medical training at SUNY-Syracuse, graduating in 1953.

After an internship at the Walter Reed Army Medical Center in Washington, DC, he served in Germany for two years. It was during his military service that Staub developed an interest in medical education. In 1965 he began his postgraduate training at the University of Pennsylvania where he worked with Julius Comroe from whom he learned about teaching, and with Robert Forster from whom he learned about oxygen-hemoglobin reaction kinetics. Both Comroe and Forster also served as presidents of APS.

Among Staub's research accomplishments are the development of whole organ structure-function relationships. He showed that the principal site of action of acute alveolar hypoxia was on the pulmonary arteries by demonstrating that the small muscular arteries are constricted and surrounded by the aveolar gas of the units they supply. In 1969 he developed the sheep lung lymph fistula, thus opening the field of lung liquid dynamics, a field which has burgeoned over the last 20 years.

Staub's research philosophy is an outgrowth of his tutelage under Comroe, who believed in finding good scientists, giving them space and funds to do research, and leaving them alone. He deplores directed research, National Institutes of Health initiatives, and the "significance section" of grant applications.

"Whenever I review a research grant or a fellowship application, I give first importance to the person and his or her ideas," Staub says. "The methods, generally the major focus of a critique, are of minor importance because by the time the application is funded plans and hypotheses have changed anyway. Therefore, basing an award on anything other than past performance and uniqueness of ideas is a waste of time.

"Every important discovery I have ever been involved with came about by chance. I do problem-based research only, using whatever methods are appropriate. If I don't have the right methods, I either learn them, hire someone who knows them, or form a collaboration."

Among the awards Staub has received are the IS Ravdin Lectureship of the American College of Surgeons, the Louis and Arthur Lucien Award from McGill University for his contributions in the field of circulation research, the Amberson Lectureship of the American Thoracic Society, and the Landis Award Lectureship of the Microcirculatory Society (for which he served as society president in 1979). An advocate of clear and simple communications, he also has received two awards for scientific writing.

INTERVIEW

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"The critical issues are to maintain interdisciplinary communication and to participate more effectively in science education."

How should APS and its members respond to these issues?

"By maintaining strong interdisciplinary programs; by attracting small societies as guests at the Society's membership meetings; by holding joint meetings with large disciplinary societies, especially pharmacology and pathology; and by involving APS in science education policy at all levels."

In addition to what it already is doing, what actions should APS be taking to assure adequate and continuing funding for biomedical research? What should APS members be doing?

"Three things, and they apply equally to both the membership and to APS. They are: expand public sector contacts; be sensitive to taxpayers' needs for real achievements; and,

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relate new advances to prior basic research. For example, a history group could take one or two major advances annually and show the connected path of research to the achievement. We should be making such analyses available to science writers and government administrators."

In addition to what it already is doing, what actions should APS be taking to blunt the challenges of animal activists? What should APS members be doing?

"Both APS and others must continue to widely spread the message about animal research. Suppose we could get the American Medical Association or other medical organizations to put in doctors', dentists', and hospitals' waiting rooms simple leaflets describing the basic research path to important new discoveries, rather than five-year-old magazines for patients to read.

"We should do likewise in schools and libraries, and we should offer to review and contribute positive views on animal research to text books."

In your view, what must the American Physiological Society do to prepare physiologists, especially those who are in the pipeline, for careers in the 21st Century?

"Enter into science education at all levels (K-12), not just the collegiate or professional levels. Attitudes are formed very early. Physiology organizations could be set up at state and regional levels to be a source for science assistance in education. APS should participate in science fairs, class projects, offer expert assistance, and sponsor student science contests. APS also should occasionally hold joint meetings with physiology teacher organizations."

What goals do you hope to achieve during your tenure as president of the American Physiological Society?

"I have two goals. One is to get APS into the science education arena at the national, state, and local levels. I want to increase the individual member's activities by offering support and advice. APS needs an education officer.

"The other goal is to develop international physiology and science education. Failure of *News in Physiological Sciences* to reach every physiologist in the world is one example of a good idea wasted."

What is your overall assessment as to the vitality of the American Physiological Society?

"APS is a mature society. North American membership has leveled off. We maintain growth on foreign members. Thus, we need more international presence.

"APS should be present at physiology society meetings world-wide. This could be set up on a rotation basis, and APS could use volunteer travelers to represent the Society. Also, APS could offer a small grant, say \$1,000, when a report of the meeting is submitted." What do you see as APS strong points in providing services to its members? What in your view are the Society's weak points in its membership services?

"APS is sensitive to its members needs, but the Society should continue to expand its membership services. Members need to have the names of those who do what in the Society along with addresses and telephone numbers.

"Unfortunately, sections continue to be weak. I would like to see each section have an executive officer, perhaps a retired volunteer who lives near the national office. Such a person could provide continuity and assist in information dissemination."

What are your views regarding the so-called "new FASEB" and its relationship with APS? How does the current relationship differ from the APS relationship with the "old FASEB?"

"FASEB has been greatly improved for taking up the role as both a service and front organization. The member socicties were at fault for any past problems because it was the societies that allowed the 'FASEB tail to wag the Society dog.' This could happen again unless the societies are vigilant.

"I do hope FASEB will be able to bring all or most of the organizations representing biological sciences into its fold."

Looking back over your 30 years as a member of APS, what do you consider to be the most significant changes in the Society?

"There have been several important changes, including the move toward more democracy, more member involvement and control. There has been better control of Society activities by Council, as well as Council becoming more responsive to the individual members."

Aside from the recognition by your peers electing you president, what have you gained from being a member of APS that, perhaps, you could not have attained if you were not a member?

"APS and FASEB have provided me with a broader view of the biological sciences than I have obtained from any other specialty society of which I am a member."

How does the discipline of physiology differ in the United Kingdom from what is practiced in the United States?

"British physiology is now largely neurophysiology and biophysics. All the rest is 'other.' In part, this is due to the animal rights fanatics who have obstructed British physiology for 100 years. Also in part, it is because clinical physiology has moved into specialty societies and out of department of physiology.

What has been the impact of the animal rights movement on research and teaching in the United Kingdom?

"There are severe limitations. Both threats and actual attacks on scientists continue. Protection of animals has achieved a higher status than the protection of humans. Research has been directed away from whole animals to neurophysiology, biophysics, cellular and molecular physiology. Human studies usually are preferred over animal investigations even though the human study is less definitive or costs more."

What has the scientific community in the United Kingdom done to meet the challenges of the animal rights activists?

"Not much, I fear. Mainly retreat, as in the United States."

Having witnessed animal activism in California and in England, how would you compare the intensity levels between the two countries insofar as the activism relates to scientists?

"Anti-animal propaganda is much greater in England. Some of the tabloids carry ads and stories aimed at animal use for any reason, including scientific research. On the other hand, licensing of scientists for animal studies is more reasonable and involves less paper work."

Thank you Dr. Staub for your time and candid answers to the questions. \bigoplus

Call For Papers

Have you received your *Call for Papers?* Deadline for receipt of abstracts for the APS Conference Interactions of the Endocrine and Cardiovascular Systems in Health and Disease and the 13th Annual Meeting of the IUPS Commission on Gravitational Physiology is *May 24, 1991.* Contact FASEB Meeting Office, 9650 Rockville Pike, Bethesda, MD 20814-3998. Tel: 301-530-7010, Fax: 301-571-1855.

On Writing a Grant Application A Personal View

Peter D. Wagner Department of Medicine University of California San Diego La Jolla, CA

As we all know too well, the imbalance between the costs of doing research and the amount of money available for research in the biological sciences has led to a crisis in research support. Presently the percentage of approved grants receiving support is unacceptably low. While the exact percentage fluctuates over time and among institutes at NIH, it is of the order of 20%. Were it not for the further administrative action we have come to know as "downward negotiation," perhaps only 15% of approved grants would be funded. It is therefore more critical than ever to do everything in our power to better our situation, individually and collectively.

On the positive side, APS and its members, both individually and as a group, are already becoming more active in Washington in the advocacy of biological research funding. However, it is the purpose of this brief article to indicate how, as an individual, you can improve your chances for research funding by the way in which you write your grant application.

To be successful, your application must possess two characteristics: 1) Excellent science and 2) Flawless packaging.

Excellent Science

This does not necessarily mean "trendy" science. It is fair to state that bad molecular biology will not fare as well as good physiology at review time. On the other hand, in 1991 it is fairly evident that those who can put together science at the molecular level with cellular, organ, or systemic physiology to explain the molecular basis of function are likely to be the trendsetters.

Excellent science contains the following three elements: 1) A basic idea that is novel, significant, and based upon sound logical principles; 2) an experimental approach that is technically feasible; and 3) a study design, adequate to achieve an answer that is as unambiguous as the state of the art permits. This umbrella covers issues such as adequate numbers of experiments, suitable planning for controls, and a workload that is appropriate both to the dollars requested and to the time proposed – neither too ambitious nor too thin. It goes without saying that without excellent science there is no possibility of funding. If you do prepare an application with excellent science, you will probably reach the top 30% of applications, but since only about half of these will receive funding, something additional must be done to improve your chances. While a certain

amount of luck will influence where you lie in the 30% (related to who reviews your application and other such pseudorandom consideration), leaving your application to chance is both risky and unwise. What you can do is to *package* your application as well as possible.

Flawless Packaging

What is packaging? It is the preparation of your application in such a manner that when the reviewer reads it, he/she has a complete understanding of what you postulate and how you plan to test your ideas. The reviewer will have all immediate uncertainties preaddressed by you in the body of the text. The reviewer will not be frustrated by a poorly structured application in which the specific aims and the methods cannot be related to one another in an easy manner. The reviewer will have a clear idea of the quantitative aspects of your application in terms of number of studies so that he/she can properly assess your budget requests. Your application will not violate the technical rules of length and type size. In brief, your application will be characterized by clarity, brevity, and lack of needless repetition.

Let us get to specifics. The following is a step-by-step tour through PHS Form 398, the standard grant application form for individual investigator applications. For each titled section of your narrative application, and then finally for the budget, the following guidelines highlight some of the key ways in which you can achieve optimal packaging for each section.

Specific Aims

Specific aims should be a list of numbered statements and not rambling paragraphs of prose. Each aim should be a short sentence or two, "bullet" in nature, and not a long paragraph. A specific aim states what will be performed experimentally to answer a particular question. It is reasonable and probably helpful to include after the specific aim, in parentheses, the hypothesis to be tested, again in a single sentence. It is also helpful to group specific aims into categories if it will clarify your organizational game plan.

Background and Significance

It is worthwhile to have a general opening paragraph to paint the broad picture. Perhaps the easiest way to illustrate this is with an entirely hypothetical example:

This project is intended to test the hypothesis that leukotrienes are the principal mediators of the airway changes in asthma. Studies will be performed in both isolated cells in culture and in intact animals to determine whether leukotriene antagonists reduce the inflammatory response in asthma as the hypothesis would predict. The following section of the grant application will develop the ideas behind this hypothesis based upon our own prior work and that of others. It will particularly address competing hypotheses and also the principal technology to be used, which is quite new to this area.

Next should follow a concise (not rambling) sufficient (but not exhaustive) literature review of the area. By all means, signpost this area according to subtopics (in the example above, subheadings referable to the competing hypotheses and to the technical aspects would be entirely appropriate). Be sure to be efficient and conserve space, but at the same time be sure that the reviewer 1) will be reassured that you know what others have done, and 2) can discern your thought process in how you arrived at the hypothesis you are testing. This is *not* the section to detail what you plan to do, however.

Preliminary Data

What is needed here is evidence that all uncertain aspects of your application are in fact feasible. In the example referred to in the previous section, if there is a novel methodology that is not yet standard, it is to your advantage to put in data (figure, table) that give the reviewer confidence that the technique is feasible and has the appropriate signalto-noise ratio to answer the questions you are posing. Focus on data, not promissory notes. In deciding what to feature here, put yourself in the reviewer's shoes and identify what you would pick up as vulnerable aspects of your proposal. It is not necessary to flood this area with irrelevant preliminary data, especially if they have already appeared in the open literature. These can usually be referenced, and if of critical importance, added as a reprint in the Appendix material.

Progress Report

If this is a continuation application, then a brief and concise progress report is necessary. Obviously this should be designed to show all of your productivity from the preceding grant period. Probably the most efficient way is to list the published paper in question and then devote no more than 2–3 lines to describe what the paper shows, and if relevant, highlight its relationship to the current proposal. Thus, this section is envisaged as a sequence of references with a brief description of the science in each.

The organization of this section is a key to successful packaging of your application. It is strongly recommended that this section be numbered precisely according to the numbering of the specific aims listed at the beginning of the application. In other words, for each numbered specific aim there should be an identically numbered Methods section. Since for most applications, many if not all methods will be technically similar across several specific aims, the following organizational plan is both space efficient and easy for the reviewer to assimilate (and therefore advantageous to you). Begin the Methods section with a single sentence stating that it will be divided into two parts, the first detailing the experimental design/specific protocols, corresponding one-for-one to each specific aim (as mentioned above), and the second containing a menu of specific experimental details of each technique to be employed.

For the Experimental Design section of an individual specific aim, begin with the scientific question stated as a hypothesis in a couple of sentences. Do not present the background a second time. Lay out the study design for the specific aim, describing the experimental preparation (species if an animal) and the number of experiments required to answer the question. Give a brief overview of the protocol design with control studies as appropriate. List the specific techniques that will be used (but do not describe them — that comes in the subsequent section). Finally, include a short paragraph on data interpretation of the experiment covered in the particular specific aim, referring to how you will use the experiment to support or refute your hypothesis according to the outcome.

After repeating this unit structure for each and every specific aim, a general Methods section should be written (the second part mentioned above) with a subheading for each specific technique. Each technique should then be described by a mixture of text and references to the literature in just enough detail to reassure the reviewer that you know what you are doing, you have familiarity with the technique, and it is appropriate to your needs.

Animal/Human Concerns

These must be faced head on, rather than ignored. Again, put yourself in the shoes of the reviewer to try and identify issues that a reviewer might be concerned about. If such questions do come to mind, you need to address how you will deal with them. Scientific review groups by and large, and the NIH in particular, are charged with the responsibility of an independent assessment of human and animal ethical concerns irrespective of local review board approval at your own institution. NIH review groups can disagree with the institutional review board, and despite excellent science and packaging, your application may go unfunded for such reasons. If human subjects are involved, it would be appropriate to have one or more physicians present during the study purely to monitor the patient and control the study from the ethical standpoint. The physician should not be involved in the research proposal in any way. Such plans should be spelled out.

Consultants

Generally, consultants are used to provide specific expertise or facilities that you lack. Make sure that the application contains a letter of agreement from each consultant you name. This is especially critical if the consultant is to help you in an area in which you lack the necessary technical expertise, rather than merely act as intellectual back up. It is certainly worth having consultants indicate in letters that they know the substance of the project by demonstrating more than a simple agreement to participate. Optimally, such letters should indicate what consultants will do and what facilities they are prepared to let you use. A sense of enthusiasm should also be communicated.

Budget

There are several ground rules for the construction of an appropriate budget.

1. The personnel list should be organized based upon the percentage time commitments necessary to conduct the stated research. The dollars simply follow and are obviously based upon institutional salary scales that not only vary from place to place but are beyond the control of review groups to modify.

2. All other expenses should be put together using a similar thought process (i.e., items required to complete the project). Again, the dollars follow, although here, if more than one option is available for a particular item, you would be wise to choose the least expensive that will satisfactorily accomplish your goals.

3. Do not attempt to fool reviewers. In any review group there are enough experienced reviewers to recognize bogus budgets when they see them. Honesty shows and will be reflected by the reviewers' response to your budget request. Artificial padding of the budget is very irritating to a reviewer and will likely produce a negative reaction. In particular, there is no point attempting to pad the budget to offset the "administrative downward negotiation" that is currently taking place. Such an attempt is obvious and will probably result in a negative rather than positive outcome.

4. Specifically, as Principal Investigator, put yourself down for enough time to reassure the reviewers of your commitment to the project. A 5% time commitment usually makes reviewers question whether the project will have appropriate supervision.

5. The supply budget should be internally consistent with the narrative text, indicating the number of studies to be performed and the technical methods to be employed. In general, reviewers are made nervous by large budgets, but if the science is excellent, the application well presented, and the budget is well justified, a large budget per se is not an impediment to funding.

Budget Justification

Personnel

The personnel budget justification is often one of the most poorly prepared parts of the grant application. All too often an investigator states: "15% of Joe Bloggs' time is needed and therefore 15% of salary is requested." This is nonsense to a reviewer. The reviewer needs to know why Joe Bloggs has to spend 15% of his time on the project. Would 10%be sufficient? Is 15% too little for the job at hand? The best way to justify personnel time is by relating percentage time to the number of experiments to be done per week and the time involvement engendered by each experiment. In addition, the special expertise of each named person should be highlighted so that his/her role is clearly identified.

Equipment

Do your homework to determine the minimum equipment needed in terms of items and dollars required to do the job. Do not request a Rolls Royce when a lesser model will do. Be sure to indicate why similar existing equipment (if any) cannot be used for the job, and be honest about it.

Supplies

When justifying supplies, in general, base your request on the costs estimated per study multiplied by the number of studies to be done over the year. Be sure to be internally consistent within the text concerning the number of studies.

Travel

Travel budgets are always cut by reviewers, and there is no point in attempting to obtain more than one, or at most two, trips per year, except under unusual circumstances. Clearly, separate travel to scientific meetings to present data should be distinguished from travel to other institutions to conduct collaborative research. Be especially wary of requesting funds for foreign travel unless it is essential for collaborative research.

Other costs

In this category, most people insert general supportive costs such as phone, mail, photocopying, and publication charges. It is impossible for a reviewer to be an expert in the analysis of costs of such items in your particular institution, so the key here is to be frugal and honest.

Conclusion

When one considers the previous advice, it becomes evident that a successful grant application must be packaged to allow the reviewer to breeze through the application without effort. To improve your chances for success, keep to the rules regarding page length and type size, face technical uncertainties openly, and prepare budgets honestly. If, however, everyone follows the advice in this article, there is a philosophical problem, which may be stated as Wagner's conundrum. If all grants reaching the Study Section contain excellent science and flawless packaging, no more than 15% can be in the top 15% (and thus receive funding)! Consequently, the above advice will only be of value if no more than about 1 in 6 of you follow it. Good luck!

As A Matter Of Opinion

This first of six columns during my year as President touches on a question dear to our hearts. What does the American Physiological Society do with our membership dues?

A regular member of APS pays \$80 annually - a sum that has not been increased for over eight years and should be taken as evidence of fiscally responsible management. We do not, as do some societies, require you to purchase one of our journals, although you do receive The Physiologist (our newsletter), Advances in Physiology Education, and News in Physiological Science (NIPS) - the last partly subsidized by income from our publications program. In fact, since publication is still a mildly profitable business, Society members receive additional benefits, which include increased funds for our programs. Publications deserves a column of its own, which it will get later this year.

I am limiting this discussion to your dues and what we financial wizards call "the Society business cost center or Society General Fund." In 1989, our income from dues by regular and corresponding (overseas) members was \$408,000 to which \$54,500 was added from other membership categories. We also received money from abstract fees, voluntary contributions (pathetic), corporate membership, and a small net income from the Spring FASEB Meeting. Our total General Fund income (not including publications) was \$609,000.

Our expenses however, were \$670,000, leaving a deficit of \$61,000 (roughly \$12/regular member). The deficit was covered by income from our reserve funds. Council does not mind incurring small deficits as long as the money is spent on physiological objectives that our members understand and approve. Unlike the national government, however, we cannot print money, nor can we sustain large continuing deficits.

How were your dues allocated? They sustain the activities centered in our home office in Bethesda, Maryland. That's where all Society business, including Membership Services, Meeting and Program Planning, Public Affairs, Education, Publications, and Subscriptions are located. These activities are the life blood of our Society, and are demanded by our members. Some of the expense categories are office space rent, phones, printing and mailing, computer facilities, insurance, program development, and staff salaries. Our Executive Director Martin Frank and his senior associates, Jim Liakos (Business Manager) and Brenda Rauner (Publications Manager) keep all our central business activities coordinated, put into effect decisions made by Council, and solicit supporting funds from industry and members to sustain our Program Endowment Fund, various awards and prizes.

The Membership Services Department keeps track of your status and assists your Section to operate. We see that you get timely notices of meetings and special programs, receive your Section newsletters, career information, *The Physiologist, NIPS*, and *Advances in Physiology Education*. We process your abstracts and help to plan programs.

In Public Affairs, we work unceasingly on your behalf for improved federal science funding, for continued availability of animals for research, and on various ethical, political, or regligious issues that may affect the physiological sciences. We recently distributed a brochure, "How to be Heard on the Hill," and have conducted informational workshops at our scientific meetings. The public affairs aspect of Society activity has mushroomed in the last decade in our effort to give your the tools to counter various anti-science forces. This will continue to be an important use of your dues.

We have recently begun to expand our efforts in science education which. I believe, will be a critical area requiring our effective input during the decade. We already administer three programs to assist minority and graduate students to attend our annual meetings. Last year, we began a summer program for high school science teachers, which is engendering great enthusiasm. There is an increasing demand for scientifically literate workers and for knowlegeable citizens who we expect will continue to willingly foot the bill for scientific research, Council believes our allocation of \$50,000 is reasonable, in fact, modest. I believe no Society gives better service for membership dues than the APS.

I belong to two small societies, which serve some of the special needs of my research. But they cannot replace the larger functions of APS. These specialty societies, while at the forefront of research, are ill-equipped to speak for physiological sciences overall. In fact, I believe it makes better sense to bring these societies into a continuing relationship with APS or FASEB from which they may derive some of the benefits our members receive.

Neither I nor other members of Council are seers, but we realize some financial problems lie ahead. As a result of massive federal training and research support in the 1950s and 60s membership in APS skyrocketed. Now we are coming into a prolonged period of maturity during which our total membership will not increase rapidly because retirements and death will balance recruitment of new members. We cannot expect to achieve budget growth through new member dues. Neither can we expect to increase net income from publications because the competition for library journal funds and shelf space is fierce. Costs will continue to rise and must be paid, and dues may have to be increased unless APS members indicate they prefer reduced meeting quality, fewer membership services, and reduced outlay for public affairs and education.

The American Physiological Society is one of America's oldest scientific bodies and is the senior founding member of FASEB. It is our duty and in our long-term interest to actively support all that APS does on our behalf.

Norman C. Staub

Sino-American Collaboration in Biomedical Research and Training: American and Chinese Physiological Societies Look Toward New Horizons

The first joint meeting of the Chinese Physiological Society (CPS) and the American Physiological Society (APS) was convened at the Institute of Biomedical Sciences (IBMS) and Institute of Molecular Biology, Academia Sinica, Taipei, Taiwan, Republic of China, November 2-5, 1990. This auspicious occasion marked more than 20 years of collaborative work between members of the CPS and the APS. The organizing committee, co-chaired by Tze-Kong Young (President, CPS) and Shu Chien (President, APS), provided a stimulating program of 6 symposia, nearly 50 oral presentations, and 40 posters. The integration of physiological research from organ systems to the context of cell and molecular biology was highlighted. Nearly 250 scientists (a quarter of whom were registered by the APS, the remainder by the CPS) from more than 10 countries provided a real international flavor to the meeting that was evenly balanced by work from both societies. Opening remarks by Cheng-Wen Wu, director of the IBMS, emphasized the potential role that this first joint meeting of the Societies and in workshop on Sino-American collaborations could play in stimulating more broadly based and closer scientific interactions. By all criteria the meeting was a success, both in its uniformly high quality science as well as its provision of a forum for expanded collaborative efforts.

David J. Ramsay (University of California, San Francisco) and **Tsai-Hsin Yin** (National Defense Medical Center, Taipei) co-chaired the Sino-American Collaboration Workshop, which included more than 50 participants. A full range of topics was introduced and discussed at length by the group. Ramsay opened the discussion by emphasizing the following: 1) Truly successful collaboration requires exchange in both directions; one-way transfers preclude real development; 2) Costs and resources of collaboration must be shared; establishing long-term commitments for support of collaborative efforts is essential; 3) The availability of up-to-date



(I-r) Shu Chien and Tze-Kong Young, CPS President

detailed information on research themes shared by investigators in both countries would enhance development of new opportunities for creative joint research activities. Yin identified additional areas critical to improved collaboration. Greater emphasis must be placed upon postdoctoral rather than predoctoral training, because postdoctoral fellows establish longer lasting bonds between the trainee and host laboratories. Yin noted that medical teaching of physiology, like research, should also be targeted for enhanced development; visiting professors well-skilled in the art of teaching as well as the current research trends are invaluable for enhancing medical education programs.

Tony J.-F. Lee (Southern Illinois University School of Medicine, Springfield) noted that the majority of outstanding research laboratories in the US have Chinese scholars. Basic science in the Republic of China (ROC) has benefitted from these training experiences, and the US has benefitted from the availability of these high-caliber young investi-



中美生理學聯合研討會 APS-CPS JOINT MEETING November 2-5, 1990, Taipei, Taiwan, R.O.C.

APS-CPS Organizing Committee. Row 4 (l-r) Hung J. Liu, Jon S. Kuo, Wann Chu Huang, Danny L. Wang. Row 3 (l-r) H. S. Fang, Maotsun Lin, S. T. Chiang, Martin Frank, Yun Lai Chan, David J. Ramsay. Row 2 (l-r) H. K. Lee, Chau-Fong Chen, C. Y. Chai, Beverly Bishop, Hsing I. Chen. Row 1 (l-r) Tsai-Hsin Yin, Vernon S. Bishop, Shu Chien, Tze-Kong Young, Eminy H.Y.Lee.

APS NEWS

gators. Hsing I. Chen (National Defense Medical Center, Taipei) added that most physiologists and scientists in Taiwan received their research training in the US and thus can be considered as representing an important extension of biomedical sciences in the US. Lee posed the question of how best to increase scientific research in Tawian. He noted that most would agree that the number of scientists traveling to the US should be increased, but that new sources for funding needed to be identified. L. C. Yang, a PhD student at National Taiwan University, spoke in favor of increased exchange and travel by students to meetings such as the FASEB Summer and Gordon Conference series. Tze-Kong Young and Sheng-Hwa Lin outlined several of the student exchange opportunities supported by the National Science Council (ROC) in conjunction with the National Institutes of Health and National Science Foundation. The National Science Council provides funds to support the exchange of nearly



(1-r) J. Y. Lin, Tsai-Hsin Yin, David J. Ramsay, H. Maurice Goodman

200 students enrolled in PhD programs in the US. H. **Maurice Goodman** (University of Massachusetts, Worcester) observed that a major success of this first joint meeting was a description of new opportunities available for Sino-American collaborative efforts. As more information on potential students and postdoctoral fellows became available, opportunities for exchange would be enhanced.

A theme of central importance in the workshop was identification of sources of funding for enhanced programs of exchange. Taiwan's strong economic growth and long-range vision have placed a high priority on scientific development. Current support from the National Science Council (ROC), National Institutes of Health, and National Science Foundation (US) was critical to maintaining the present level of exchange, but new sources would have to be identified for a significant increase in collaborative efforts to be realized. Biotechnology and pharmaceutical industry as potential targets for support were highlighted by Goodman. Ramsay and Chien discussed the possibility of raising funds from those Chinese both in Taiwan and the US that benefitted from and well understood the impact of exchange programs on development of scientific programs and their own individual careers. Connie C. W. Hsia (University of Texas, Dallas) made the worthwhile suggestion that Chinese who are now



APS-CPS Banquet

citizens and residents of the US should be approached for funds for supporting the Sino-American interchanges. She reminded us of the high value that all Chinese place upon science and higher education. Efforts to solicit funding for Sino-American exchange in private and industrial sectors were supported by the group, but identifying the mechanisms to achieve this goal clearly requires more thought and activity. Anecdotal information from the participants suggested that significant funds were available if the appropriate mechanisms could be adopted to secure them. Martin Frank, Executive Director of APS, suggested that corporate support for exchange programs would not be driven primarily by the pursuit of science but more likely by recognition that the biotechnology/pharmaceutical industry needs highly skilled researchers to meet their own future staff requirements. The need for expanded opportunities for student loans was emphasized by Beverly Bishop (SUNY, Buffalo). Yin noted that at the National Defense Medical Center support mechanisms for students require payback agreements in service time; C. Y. Chai (IBMS, Taipei) questioned whether students themselves could arrange financial support for exchange activities. Peter D. Wagner (University of California, San Diego) expressed the strong intellectual interest of the Society in Sino-American exchange, but noted that its ability as a society to generate federal funding for such



Poster Discussion

projects was limited. Shu Chien closed the discussion by expressing the hope that funds can be generated in both the US and ROC for the support of exchange of students and young scientists, e.g., that of the National Science Council (ROC) could not only be maintained but expanded. Similar types of funding should be sought from other governmental agencies and private sectors.

How can Sino-American collaborative efforts in research and training improve in the 1990s? Clearly some new initiatives are required to provide a template for successful interactions and a more broadly based understanding of the needs in physiology for both countries. In addition to the National Science Council (ROC), National Institutes of Health, and National Science Foundationa (US), the American Bureau for Medical Advancement in China (ABMAC) seeks to facilitate greater understanding and ties between the ROC and the US. **Richard Pierson** (Chairman, ABMAC; St. Luke's Hospital, New York) and **Hope Phillips** (Executive Director, ABMAC) outlined the very successful efforts of their organization in advancing the exchange of medical and scientific knowledge and placing ROC fellows in the US.

A greater appreciation is evolving for the critical role physiologists can play in applying the new tools of cell and molecular biology to fundamental questions in biology and medicine. Little doubt exists of the power of new technologies to provide molecular descriptions of fundamental aspects of physiology and physiological regulation. Integrating the information at the organ-system levels is a formidable task, much like the analysis of the human genome may be compared with the task of accumulating the genetic information itself. It is at this threshold that physiologists play a particularly important and unique role, and it behooves us both in the US and the ROC to train the very best young minds for the challenging opportunities that lay ahead.

Both the ROC and the US recognize the grave potential dangers of scientific work force shortages in critical areas of science and technology. For the US a shortage in researchers and technicians is already obvious, and it is in this area that benefits will accrue through enhanced exchange of students and postdoctoral fellows. The commitment of resources necessary to guarantee a broadening international recognition of its biomedical research program is obvious



Craig C. Malbon



James A. Schafer with CPS colleagues

in the ROC. To realize this potential, however, Taiwan must continue to network its leading laboratories with those in the US and elsewhere in the world. As the opportunities for biomedical research continue to become more and more competitive in the ROC, the potential problem of a "brain drain" to the US seems less likely. But, as an emerging force in international science and technology, the ROC must recognize the shared responsibilities of collaborating nations to meet the international pressures for their scientific work force. As pointed out in the workshop, the ROC and the CPS/APS joint meeting benefitted richly from participation of scientists that emigrated to the US and now have two "homes." Broadening opportunities for exchange may well maximize the development of what collectively is our most precious resource: the young scientists.

It is hard not to be impressed by the commitment of the scientists and educators of the ROC in their pursuit of excellence in research and training in biomedical sciences in general, and physiology in particular. Individual efforts through Sino-American collaboration can assist in this process; however, the development of longer term broader relationships, not restricted to a single episode in training, seems to be the major task. To this end emphasis should be placed upon developing "hybrid" opportunities between institutions and individual laboratories in the US and the ROC in which the fabric of research is created by recognition of unique assets in each locale. For the ROC, the benefits of access to outstanding well-established laboratories for training are obvious. For the US, the benefits of access to bright young investigators to participate in exciting research endeavors are also obvious. And perhaps the greatest potential benefit is the identification of unique opportunities for research activities in the ROC in which US teams can participate. The incentive for collaboration by both countries should be obvious. The ROC identifies areas in which carefully invested resources provide for rapid growth in international scientific eminence, and US teams develop collaborative research programs that would be difficult to support in the more established US system in which the commitment to significant new initiatives is limited. The goal is to ensure that research activities of both countries benefit fully and that the realization of the aspirations of the ROC for an outstanding independent program include development of strong long-lasting scientific ties to its collaborators abroad.

T.-H. Yin closed the workshop by summarizing the salient features discussed by the panel members and conferees. Most notably, great enthusiasm exists to enhance Sino-American collaboration in research and training. The CPS and APS should encourage committee activity to formalize goals in three areas: I) enhanced opportunities for graduate and postdoctoral training in a manner that creates long-lasting ties between laboratories in the US and the ROC; 2) greater exchange of visiting scientists to participate in medical and graduate education; and 3) establishment of mechanisms to garner support from government, corporate, and private sources to fund longer term commitments to US/ROC collaborative efforts. Thus it is the responsibility of physiologists in both societies to continue the momentum created by this most successful first joint meeting of the Chinese and American Physiological Societies.

> Craig C. Malbon Department of Pharmacological Sciences State University of New York Stony Brook, NY

American Bureau for Medical Advancement in China

The Workshop on Sino-American Interactions in Research and Training held during the APS-CPS Joint Meeting provided the attendees with an opportunity to learn about the American Bureau for Medical Advancement in China, Inc. (ABMAC). Founded in 1937, ABMAC is a nonpolitical, nonprofit, medical, and scientific service organization dedicated to the advancement of health in the Republic of China (ROC). The organization exists to provide a means for the exchange of medical and scientific knowledge and to foster cooperation between the ROC and the United States in biomedical teaching, research, and health care. ABMAC's programs are designed to serve the educational and health needs of the ROC, working through its established medical schools and other scientific and health service institutions. Some of the programs include the following:

- A Fellowship Program that assists ROC fellows who already hold or are preparing for health administration or teaching positions in Taiwan, and who have been approved by the parent institutions to undergo advanced training in the US to fill specific assignments at home.
- A Visiting Specialists Program that provides a network of professional resource people from the US who are available to assist in responding to program needs as requested by ROC institutions.
- A Nursing Program that includes recruiting and sponsoring US nurses for specialized tasks as requested from Taiwan and placing and sponsoring nurses from Taiwan in the US.

For additional information about the organization and its programs contact The American Bureau for Medical Advancement in China, New York Academy of Medicine, 2 East 103rd Street, New York, New York 10029.

Chinese Physiologists Added to Clearinghouse for Developing Countries

The recent joint meeting of the APS with the Chinese Physiological Society, Taiwan, Republic of China, was originally planned to include a visit to mainland China. Unfortunately, the political situation in China prevented the visit. However, in an effort to maintain contact with colleagues on the mainland, Meng-Chin Chen, President, Chinese Association for Physiological Sciences (CAPS), People Republic of China, has provided a listing of key individuals in the Chinese physiological community. These professors and department directors are interested in developing people-topeople scientific exchanges designed to promote understanding and strengthen friendship between the scientists of the CAPS and APS. A total of 19 CAPS members, with their institutional affiliations and research fields, have been provided to APS for inclusion in the Clearinghouse for Developing Countries. Members of the APS interested in making contact with these individuals should write or call the APS Executive Office.

NIDDK Travel Fellowships for Minority Physiologists

NIDDK Travel Fellowships for Minority Physiologists are open to advanced undergraduate, predoctoral, and postdoctoral scientists who have obtained their undergraduate education in Minority Biomedical Research Programs (MBRP) and MARC eligible institutions, as well as students in the APS Porter Development Program. Applications may also be submitted by minority faculty members at the above institutions. Funds will provide transportation, meals, and lodging to attend the APS Conference, "Interactions of the Endocrine and Cardiovascular Systems in Health and Disease," in San Antonio, Texas, September 29-October 3, 1991. The specific intent of this award is to increase participation of the pre- and postdoctoral minority students in physiological sciences. Applicants need not be memers of the APS but should be a US citizen or hold a permanent resident visa. Applications should include *I*) information on academic background and experience; 2) a written statement of interest in research in physiology; 3) a letter of recommendation from the applicant's mentor; 4) a list of publications, if available; 5) a statement indicating the underrepresented minority (Black, Hispanic, or American Indian) with which the applicant identifies himself/herself; 6) an estimate of required travel and per diem expenses. The deadline for receipt of completed applications is June 1.

International Society for Heart Research Annual Meeting

The APS will be a guest society at the 1991 Meeting of the International Society for Heart Research (North American Section) to be held May 29-June 2 in Cincinnati, Ohio. A major theme of the program is "The Heart and Blood Vessel Wall in Development and Disease." Three parallel themes are "Blood Vessels in Health and Disease; Heart Oxygenation, Injury, Protection; and Heart Development, Hypertrophy, and Failure. Two half-day symposia on Controversies in NMR and Cells as Model Systems will also be held. Information: Dr. Nick Sperelakis, ISHR/1991 Conference Office, Department of Physiology and Biophysics, University of Cincinnati Medical Center, 231 Bethesda Avenue, Cincinnati, OH 45267-0576. Tel: 513-558-5636. Fax: 513-558-5738.

Regional Meeting of IUPS Prague, Czechoslovakia June 30-July 5, 1991

The Czechoslovakia Physiological Society is sponsoring the International Union of Physiological Sciences' regional meeting in Prague this summer and invites its American colleagues to attend.

Ambassador Chevy Chase Travel, Inc., is offering a 5% discount on the nonrefundable APEX fare from Washington, New York, and Boston on Lufthansa Airlines. Passengers may fly into one city and out of another, but no stopovers are permitted. For fare rates and information, *contact:* Ambassador Chevy Chase Travel, Inc., 2 Wisconsin Avenue, Chevy Chase, MD 20815. Tel: 301-656-2021 or 1-800-424-8282, Fax: 301-907-4787.

Correction

President Chien Visits Tokyo and Seoul

Following the APS/CPS Joint Meeting in Taipei, APS President Shu Chien visited Tokyo at the invitation of the Physiological Society of Japan. He met with President **Masao Ito** and several members of his council on November 7 and 8, 1990. Chien participated in the 88th birthday celebration of President Ito (also an APS honorary member).



Shu Chien (l) and President Jeh Hyub Kim (r) of the Korean Physiological Society.

Chien then visited Seoul at the invitation of the Korean Physiological Society and met with President **Jeh Hyub Kim** and his council on November 12, 1990. There were fruitful discussions on how to further enhance the interaction of these two societies with APS, including exchange of physiologists and holding of scientific meetings.



Shu Chien (r) and Sir John Eccles (l) at his 88th birthday celebration.

APS Conferences

From Channels to Cross Bridges Bar Harbor, Maine July 13-16, 1991

Interactions of the Endocrine and Cardiovascular Systems in Health and Disease San Antonio, Texas September 29-October 3, 1991

> Integrative Biology of Exercise Colorado Springs, Colorado September 22-26, 1992

The Cellular and Molecular Biology of Membrane Transport Orlando, Florida November 4-8, 1992

A member of the Long Range Planning Committee was incorrectly listed as R. H. instead of J. H. Mitchell (*The Physiologist*, 33(6): 180, 1990).

News From Senior Physiologists

Letters to Horace W. Davenport

Harold Wiggers writes that after 18 years as a physiologist and 21 years as dean and executive vice president of Albany Medical College, he retired to spend the next two-and-a-half years as an acting dean and senior consultant to assist in the development of a new medical school at East Carolina University. He also added that, "Upon my second retirement in 1978 I faded away to Vero Beach, FL, where I have thoroughly enjoyed 13 years as a nonscientist senior citizen.

"Perhaps I have made some contribution to the health of the community by serving on the Planning and Building Committee of the local hospital. Considerable effort has been devoted to attempting to improve performance in my two major hobbies, the games of golf and bridge. The former helped keep me physically active and the latter, somewhat mentally acute.

"There was hardly a day in my 42 years of professional activities when I failed to anticipate arriving at my laboratory or office to pursue my plans and to face daily challenges. What percentage of working Americans can truthfully utter that statement?

I. S. Edelman, who served as chairman of the Department of Biochemistry and Molecular Biophysics at the College of Physicians & Surgeon of Columbia University for 10 years (1978–1988), writes that he now has the luxury of spending almost all of his time overseeing his laboratory. He was given emeritus status in January.

"My research interests began with renal and electrolyte physiology and then evolved to studies on regulation of transepithelial transport by aldosterone, and most recently on hormonal and ionic regulation of the Na, K-ATPase system. During the last two years, however, I became increasingly intrigued with the extraordinary potential of the Human Genome Initiative, especially for clinical research, and for the future of clinical medicine. Consequently, I phased out all of my research programs (with one residual exception) and since January 1990, I have served as Director of the Human Genome Program at Columbia University."



L. Van Middlesworth recently returned from the USSR as a member of the United States delegation helping to evaluate possible thyroid consequences of the Chernobyl accident in 1986. He said he was required to retire two years ago at the age of 70, but the department chairman at the University of Tennessee, Memphis, allowed him to retain his laboratory, where he is assisted by his wife. Together they maintain the most complete monitoring of world-wide fallout effecting thyroids, going back to 1954; volunteers in five continents send thyroid glands every two to four weeks. Currently he is concentrating on I¹²⁹ and Cs¹³⁷.

He still lectures and one day a week he operates a thyroid clinic with medical fellows and residents, which manages patients with thyroid disease. He also worked for several months with a visiting Russian scientist who was supported by the Uzbekistan Academy of Science.

Adam Denison writes from Winston Salem, NC, that he was surprised to receive the Society's greetings on his 70th birthday, thinking such greetings were for "old-folk types," not for himself. Nevertheless, he finds gray hair and retirement do have their compensations; he has only to murmur "senior citizen" to receive extra consideration. After 20 years designing and constructing equipment for physiological research, he finds it satisfactory to leave repairs of a TV or a burglar alarm to someone else.

Letters To David Greene

"I was for 10 years a research physiologist at the Maudsley Hospital in London, then 20 years at the Massachusetts General Hospital as a neurophysiologist at the Harvard Medical School", writes **Mary A. B. Brazier**. "In 1960 I moved to the University of California, Los Angeles, where I held the positions of professors of anatomy and physiology until my retirement two years ago.

"The UCLA Biomedical Library has honored me by establishing a 'Brazier Collection,' where all my writings, certificates, etc., are now housed. They have my 210 reprints (bound), the slides I used for lecturing, and many photographs I collected for my historical works. I published eight book and some were transiated into French, Japanese, Italian, Polish, Russian, Spanish, and Chinese."

James K. Alexander continues working on the cardiology service at the Houston Veterans Administration Hospital, rotating on the consultation, cardiac catherization, and coronary care unit services. He also will be assuming the directorship of the cardiac rehabilitation program at the Houston Methodist Hospital, now under the aegis of the cardiology section of the Baylor College of Medicine.

Alexander said that most of his recent contributions to the literature have involved chapters or review articles relating to the heart in obesity. "However, I do have a continuing interest in the investigation of the circulatory effects of high altitude exposure," he wrote, adding that he recently completed some studies on the effects of high altitude on the left ventricular function, working in conjunction with **Jack Reeves.** Both are involved at the Colorado Altitude Research Institute in ongoing efforts to examine the effects of moderate altitude exposure on patients with a variety of disease states.

Richard Bernard spent his 80th birthday with his six sisters, three of who are older. He retired in 1978 from Laval University where he taught comparative animal physiology for 37 years. His activities in Quebec are limited to regular visits with colleagues at the university, golf in the summer, and bridge in the winter.

"Retirement is what you plan to make of it," writes **Karl H. Beyer, Jr.**, who has been retired for almost 18 years from the Merck, Sharp & Dohme Research Laboratories where he was a senior vice president. "It is still a sevenday week, but retirement means to me freedom to determine what one wants to do and when. Camille and I do get around to parts of the world we have not seen previously or we stay home (Penllyn, PA) and enjoy taking care of the house and grounds.

"I had planned to retire earlier when I joined the company, but 30 productive years passed before the urge to get on with the rest of my life prevailed. Many of the interesting things I have done since have not been by financial considerations. For example, I have been a Visiting Professor of Pharmacology with Senior Faculty status at the Penn State University School of Medicine at Hershey since my retirement."

Beyer also offered these words of advice: "Plan your life as to what you want to do and when. Do your best. Do something useful so your institution can express its appreciation. Don't abuse your health. Learn to enjoy things in which you can participate personally."

"I am still in private practice, my 46th year," writes **Clarence M. Agress**, "and I still enjoy it because of the warm relationships I have with patients of many years standing. In addition, I operate a cardiovascular laboratory which has rekindled my interest in cardiology." He noted that he still has time for golf, tennis, gardening, painting, and an occasional scientific paper, adding, "Two years ago I was proud to make Medical Milestones in the American Journal of Cardiology as the first investigator to show that coronary clots could be successfully lysed by enzymes without damage to the myocardium." His advise to young investigators is not to be sidetracked by opinions of others and to be skeptical about pronouncements of experts.

"Life here in LaJolla is pleasant," reports **Richard Bancroft**, "except for the traffic. I am content to putter around the house and garden with walks to the Village and around the beaches and shoreline. We take trips every year or so to England or Australia and Southeast Asia for a few weeks where we visit relatives and friends."

"It is now 10 years since I officially retired as senior research physiologist with the National Highway Traffic Safety Administration," Fred B. Benjamin writes from Silver Spring, MD. "For the first few years I continued as a parttime consultant with the government, maintained my position at the Georgetown University medical school, was a docent at the National Air and Space Museum, and published a book, The Effects of Alcohol and Drugs on Driving. Gradually I dropped these activities and became more involved in the peace and environmental movements.

"I am now 78 years old and as busy as I was when I was working. However, I now accept things only if I am interested and believe I can contribute something. I continue to play bridge, chess, ping-pong, and pool as well as swimming and hiking. For many years I participated in the Maryland Senior Olympics and received a number of gold and silver medals for swimming. For me, this is a good incentive to maintain my physical activities."

Last year E. B. Brown, Jr., and his wife, Helen, moved from Bella Vista, AR, where they retired in 1980, to Lehigh Acres, FL, where their son, who is a pilot for Northwest Airlines, and his wife have a home nearby. "We are again on a golf course and I play three or four times a week," Brown writes. "My principle problem is with the companies manufacturing golf balls. They keep advertising that the new balls are more lively and go farther. That is obviously not the case since my drives with these new balls fall 50 yards short of my drives with balls I used 25 years ago."

Eugene Ackerman will retire from the University of Minnesota in June. In looking back he noted, "I am keenly aware of the numerous changes that have occurred in the university atmosphere in recent years. Perhaps I would not have wanted to be a university professor 41 years ago had I pictured the current university climate. My mental image of a university at that time bore little resemblance to today's reality."

Tom Almy writes, "I am occupied principally teaching (at Dartmouth) a medical school course on the application of the social sciences and of the humanities in everyday medical practice. After seven years of this, we are writing up our program in hopes others will want to share our satisfaction in teaching of this kind."

Paul C. Bucy, who now is emeritus professor of both neurology and neurosurgery at the Bowman Gray School of Medicine, writes from Tyron, NC, that his advise to younger colleagues is that there are two things of importance to their future development and progress: association with older men and women who are outstanding and capable of giving advice; and travel in the United States and abroad to centers where they can learn what is going on related to their interests.

"Actually, I can't say I am retired – just have a change in emphasis," writes **Majorie V. Baldwin.** "I am involved, since 1977, with the Wildwood Lifestyle Center and Hospital, a small hospital just outside of Chattanooga in north Georgia. We emphasize lifestyle change and therapy for medical and surgical conditions with emphasis on physiologic remedies. I am currently medical director of this institution.







13th Annual Meeting IUPS Commission on Gravitational Physiology

September 29-October 3, 1991 San Antonio Marriott Rivercenter San Antonio, Texas Also, I edit our health journal, *The Journal of Health and Healing*, which emphasizes family health, sound nutrition information, and other matters." She also said her husband, **Burnell Baldwin**, is science advisor to the medical staff. He is active in library research and informational retrieval, teaching postdoctoral students who come to investigate our lifestyle change work, and speaking to lay and professional groups on health topics.

Nate Brewer writes from Chicago that he currently is collecting as much information as he can on the physiology of the rabbit, adding that the American College of Laboratory Animal Medicine is preparing a second edition of the *Biology of the Rabbit*. Since his retirement in 1969 he has increased his activities in the accumulation and collection of the morphophysiologic differences between laboratory animals, noting that the more we know about those differences the better able we are to select the best animal for a particular study.

Saul Benison and Cliff Barger both wrote about their work with Elin Wolfe on the second and final volume of their biography of Walter B. Cannon, which will cover the years from 1918 to 1945. The first volume, *Walter B. Cannon: The Life and Times of a Young Investigator* was published recently by the Harvard University Press.

"At the moment I am steeped in the decade-long controversy of Cannon vs. Stewart and Rogoff on Cannon's Emergency Theory of Adrenal Function," Barger wrote. He would appreicate hearing from anyone who has first-hand information on the battle that enlivened the annual meetings of the Society in the 1920s or who has any correspondence regarding the fight.

Benison reported that an article on Cannon's collaboration with the British on traumatic shock is due to come out in the spring in the English journal, *Medical History*. "Last May I gave the annual Garrison Lecture at the meeting of the American Association for Historical Medicine on Walter Cannon and the politics of science between 1920 and 1940," Benison wrote. "Last October I gave two lectures at the University of Minnesota medical school, one on Cannon and the theories of shock, the other on Sabin and the discovery of B virus."

Letters to John T. Reeves

"I am still Deputy Director for Intramural Research at the National Institutes of Health, a position I have held for seven years now, and I have no plans at the present to retire as I enjoy what I am doing," reports **J. Edward Rall**. He said that several years ago he looked through old issues of *The Physiologist* to see what retired physiologists had written about what they were doing. After compiling a list of appriximately 80 responses it was somewhat astonishing to realize that well over half were in their 80s and were continuing a scientific career.

Letters to Helen M. Tepperman

"I still enjoy coming to UCSD about four times a week and keeping abreast of an ongoing research program in microcirculation," Benjamin Zweifach reports from San Diego. "The language, tooks, and level of sophistication have changed so much that it is a challenge just to keep up with a small fraction of the field. And it is particularly satisfying to see answers provided for questions we wresteled with some 40 and 50 years back. I still befuddle my colleagues and students with relevant literature references from the 1940s and 1950s which are all but forgotten in today's megabyte advances."

"I have fully retired from obligatory duties at New York Medical College, but still maintain my professorship of medicine and will continue to do student teaching," writes **Daniel Stone**. "My wife and I spend several winter months in Florida exploring the environment. I do a great deal of nature photography and some volunteer work for an organization dedicated to the preservation of marine turtles."

Advances in Physiology Education Reader Feedback Survey

The editors of *Advances in Physiology Education* would like feedback so that we can direct the publication to best fit the needs of the readership. Please help us by completing the questionnaire and mailing it to the APS, Publications Office-TP, 9650 Rockville Pike, Bethesda, MD 20814-3991.

Harold Modell

Directions: Please respond to the following statements according to the code:

SD = Strongly Disagree D = Disagree N = Neutral A = Agree SA = Strongly Agree

| 1. | A peer-reviewed journal focused on physiology education addresses an important need within the physiology community. | SD | D | N | A | SA |
|---------------------------|---|----|---|---|---|----|
| 2. | I have read previous issues of Advances in Physiology Education. | SD | D | N | Α | SA |
| 3. | The articles that I have read in Advances in Physiology Education have helped me understand or address issues facing my own institution. | SD | D | Ν | A | SA |
| 4. | I have used the Technology-Based Resources feature that appears in the June issues to help locate computer software for my teaching efforts. | SD | D | N | A | SA |
| 5. | The Abstracts from Current Literature feature that appears in the De- cember issues has helped me become aware of educational research relevant to my teaching efforts. | SD | D | N | A | SA |
| 6. | More articles should be devoted to specific activities (e.g., student labora- tories) that I can use in my own teaching efforts. | SD | D | N | A | SA |
| 7. | There should be more tutorial articles focused on how I can improve my teaching techniques. | SD | D | N | A | SA |
| 8. | There should be more articles addressing issues facing physiology teaching at the undergraduate level. | SD | D | N | A | SA |
| 9. | There should be more articles addressing issues facing physiology teaching in medical education. | SD | D | N | Α | SA |
| 10 | There should be more articles addressing issues facing graduate physiology training. | SD | D | N | A | SA |
| Comments and suggestions: | | | | | | |

Monograph Reviews Animal Rights

A monograph entitled, "America's New Extremists: What You Need To Know About the Animal Rights Movement," has been published by the Washington Legal Foundation.

Washington lawyer David T. Hardy takes a comprehensive look at the movement including the significance of laboratory animals in biomedical research, the growth of animal rights terrorism, and the need for increased law enforcement. Copies may be purchased for \$10.00 from the Washington Legal Foundation, 1750 N Street NW, Washington, DC 20036.

NIH Plans Workshops Series on Lab Animal Care and Use

The Office for Protection from Research Risks at the National Institutes of Health is sponsoring specific topic workshops regarding the implementation of the U.S. Public Health Service policy on Humane Care and Use of Laboratory Animals.

The workshops are open to institutional administrators, institutional animal care and use committee members, laboratory animal veterinarians, investigators, and other staff persons who have responsibility for management of institutional animal care and use programs.

A workshop on recurrent controversies in protocol review will be held May 2 and 3 at the Hyatt Regency Hotel at Union Station in St. Louis. Persons interested in attending should contact Ms. Loretta Giacoletto, Continuing Medical Education, Washington University School of Medicine, Box 8063, 660 S. Euclid, St. Louis, MO 63110 (314-362-6891).

A workshop on resolving the ethical dilemmas in animal protocol review will be held September 12-13 at the Holiday Inn Crowne Plaza in Seattle, WA. Persons interested in attending should contact Ms. Gail Wolz, Department of Comparative Medicine, Box SB-42, University of Washington, Seattle, WA 98101-3048, Tel: 206-543-9678.

Animal Welfare Regulations for Exercising Dogs, Psychological Well-being of Primates Assailed

The ink had hardly dried on the executive order promulgating rules for the handling of dogs, cats, and nonhuman primates when the new regulations came under attack by the Humane Society of the United States (HSUS).

"My main complaint is that the USDA (US Department of Agriculture) has given too much discretion to the researchers to decide the details of exercise for dogs and psychological well-being for primates," said Martin Stephens, HSUS vice president for laboratory animal programs, according to the Associated Press.

The newly enacted regulations represent the third and final step in a five-year effort by USDA to promulgate rules putting into effect the December 1985 Congressional amendments to the Animal Welfare Act. Part I of the regulations established the definition of terms for animal welfare regulations and Part II established the administrative requirements for a regulated facility and the responsibilities for individuals who deal with animals. Those rules became effective in October 1989.

Although the rules for Part III became effective in March, institutions have until August 14 to develop plans for exercising dogs and for promoting psychological well-being for nonhuman primates. Moreover, as a means to minimize the economic impact on capital construction, the new regulations give regulated facilities until February 15, 1994, for meeting the space standards for enclosures for cats and nonhuman primates; height requirements for dog enclosures and perimeter fences surrounding dogs on a tether; and perimeter fences surrounding nonhuman primates housed in either outdoor or sheltered facilities.

James W. Glosser, administrator for USDA's Animal and Plant Health Inspection Service, said a "special effort" was put into drafting the standards, adding, "We have made room for variations in the way individual animals behave and for differences in the way they are used and housed."

But animal welfare advocates continue to claim that USDA failed to go as far down the regulatory road as it should have.

"We're certainly happy that there are now rules for exercise for dogs and psychological well-being for primates," Stephens said, "It's just that we are disappointed with the form of the rules. (USDA) simply lays out a few parameters, but leaves it to researches to decide all of the details on how to carry out the rules.

"These regulations were some five years in the making, and all USDA could come up with, apparently, was simply to say, 'here are the important parameters, you guys develop your own plan'."

Glosser said the standards for the psychological well-being of nonhuman primates require the development of a plan that "accounts for the social grouping of the animals involved and gives them a chance to express activities appropriate for their species." The plan also must provide for the special needs of young animals, including those that show distress and those housed in solitary cages.

Glosser also noted that the regulations "specifically forbid keeping a nonhuman primate in a restraint device unless required for the animal's health or a specific research project.

In drafting the standards, Glosser said his agency looked for wording that would promote the well-being of animals and still be enforceable. Some objectives were developed according to engineering standards, others were keyed to performance, and some with both standards in mind. (Engineering standards set design requirements, such as a formula for determining floor space in a pen for a dog, based on the dog's size; performance standards require that each dog must be able to turn freely, stand, sit, lie in comfortable positions, and walk in a normal manner).

Glosser said compliance will be flexible since the regulations offer more than one option for achieving certain standards. This flexibility is said to reduce the cost of compliance with the Animal Welfare Act to an estimated \$537 million, less than one-third of the \$1,750 billion projected when the rules for Part III were first proposed in March 1989.

When Part III regulations were first proposed it was the response from the scientific community over the estimated costs that led to the redrafting of the regulations from purely engineering-based standards to rules that include performance-based standards.

W. M. Samuels

Animal Regulations: Interpretation and Integration With PHS Policy

The newly promulgated Animal Welfare Act regulations contained performance-based standards that rely largely upon consistent and reasonable interpretation of the requirements and a common understanding of both US. Department of Agriculture (USDA) and Public Health Service (PHS) review procedures.

The USDA's Animal and Plant Health Inspection Service and the Division of Animal Welfare, Office for Protection from Research Risks, at the National Institutes of Health are cosponsoring regional meetings to provide information and to solicit comments from those interested in or responsible for the humane care and use of laboratory animals in biomedical research.

Meeting sites include the Hyatt Regency Hotel at Union Station in St. Louis on May 1 and J.W. Marriott Hotel in Washington, D.C., on June 6. There is no registration fee to attend.

Persons interested in attending should contact Mrs. Yolanda Hunt (301-436-6698); persons wanting information about program content should contact Dr. Timothy D. Mandress (301-436-8341).

Berkeley Bans Draize, Skin Tests; California Considering Such Ban

Berkeley, CA, has adopted an ordinance banning within the city the use of the Draize and skin irritancy tests on animals.

The law, perhaps the most restrictive of any such legislation anywhere in the United States, states: "Except as specifically required by state or federal law, no person shall perform either the Draize eye irritancy or the skin irritancy tests for any purpose within the City of Berkeley."

Meanwhile, a bill was introduced in the California General Assembly that would place a statewide ban on the Draize or skin irritancy tests on animals for the purpose of testing cosmetics and household products. The bill excludes animal testing for medical research or tests on medications, drugs, and foods.

The same bill was introduced and enacted by the General Assembly last year but was vetoed by California Governor George Deukemejian.

Legal Briefs. . .

Students for the Ethical Treatment of Animals at the University of North Carolina won a law suit against the institution's animal care and use committee that grants the animal advocates access to records relating to research involving the use of animals.

The North Carolina Court of Appeals reversed a lower court decision, noting that the documents sought do not contain trade secrets and that the Supreme Court has ruled that the First Amendment does not include an exemption for academic documents. The appeals court, however, ruled that the university could remove the names, addresses, telephone numbers, departments, and experience levels of the researchers so that the individuals involved would not be harassed and that proposals disapproved by the committee need not be disclosed.

Ninth Circuit US Court upheld a lower court determination that PETA (People for the Ethical Treatment of Animals) lacked standing to sue federal agencies whom they claim violate the National Environmental Policy Act. PETA had sued in 1988 the US Department of Health and Human Services, charging that the agency violated the act by failing to prepare an environmental impact statement before awarding grants to institutions in the San Francisco area. PETA claimed that the department's funding of research involving animals resulted in a number of environmental impacts adversely affecting PETA members use of the San Francisco Bay areas for recreation, aesthetic, quality of life, and health purposes.

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

University of Kentucky Science Outreach Program

D. T. Frazier and Susan Hodgetts Department of Physiology and Biophysics and Communications and Advancement Office University of Kentucky Lexington, KY 40536-0084

Evidence is mounting that the US is in the throes of an educational crisis related to the science training of our children. Recent reports estimate that 80% of our precollege students are scientifically illiterate. Our children are not incapable of learning, they are simply avoiding the science curriculum. Students view the science curriculum as too hard, too boring, or consider the ultimate career benefits as inadequate to justify the effort. The potential impact of this situation on our society is staggering. Where will we find the scientists, inventors, chemists, health care professionals (doctors, dentists, nurses, and pharmacists) and, most importantly, future educators when our pool of gualified applicants has evaporated? Our nation is already showing signs of losing its competitive edge in science and mathematics. The elementary, middle, and senior high school teachers cannot be expected to reverse this trend without help from every other sector of the educational enterprise.

One relatively untapped resource that could be enlisted to combat this problem is the superb and highly qualified science/biology faculty of our colleges and universities. It is critical that they join the precollege teachers in a partnership dedicated to making the science curriculum offered to our youngsters more challenging and exciting. To this end, the College of Medicine in concert with the University of Kentucky Research and Graduate Studies has formed a science outreach committee to function as a multifaceted link between the scientific resources of the College of Medicine and every science/biology teacher and student in the Commonwealth of Kentucky.

The outreach committee consists of a coordinator, who serves as the contact individual and dispatcher; the graduate directors of all graduate programs affiliated with the Medical Center (including toxicology and biomedical engineering); and a representative from the biological sciences faculty on campus. Collectively these individuals possess a wealth of information that can help solve the problems that surface in the science classroom. More importantly, as program directors they have a vested interest in helping to improve the quality and quantity of potential recruits to their respective programs. Each committe member, therefore, serves as a resource person for his/her specific area of expertise as well as an assistant for the planning and implementation of *proactive* programs designed to increase the visibility and viability of careers in the sciences.

Program Activities

Science Hotline

A toll-free 800 Science Hotline has been established within the College of Medicine and made available to every science/biology teacher and student in the state of Kentucky. The availability of this phone linkage and its purpose was made known to potential users in the science community by placing advertisements in appropriate educational newsletters (Kentucky Science Teachers Association and the Kentucky Educational Association). In addition, radio, television, and newspaper ads were prepared and released throughout the Commonwealth. Any teacher or student that has a substantive question or a need for resource material related to their school science activities is encouraged to take advantage of this hotline. Requests or inquiries are channeled by the coordinator to the appropriate member of the outreach committee for resolution. The availability of these experts willing to offer advice or lend a helping hand should provide the necessary encouragement for local teachers to become much more creative in their approach to the science curriculum. In one month of operation we have received over 200 calls from teachers and students.

Newsletter

We currently circulate "UK Science and You" packets to over 700 teachers in 96 Kentucky counties. The hallmark of this publication is to provide teachers and their students with information concerning activities and resources available at the University of Kentucky that might prove useful in their classrooms. Typically, an issue contains a billboard of University events/programs as well as short articles that highlight the role that scientific research plays in the development of new technologies for health care and industry. Plans call for the addition of a "pull-out" section for students that contains information about opportunities for summer research experience; features on students who have participated in such programs; features describing research activities of undergraduate and graduate students from Kentucky communities; suggestions for science fair projects; and a calendar of campus events that might be of interest to students.

Campus Visits

On Site

In addition to serving as a conduit for information inquiries, the Science Hotline has already become a focus for coordinating science class visits to the Medical Center, and conversely, visits by our faculty and students to precollege classrooms. Over the years it has been quite common for a few interested high school teachers to make requests via the Public Affairs Office to visit the college with their students. All too frequently this visit resulted in a rather hastily organized and cursory tour of the facilities. Assigning the coordination of these visits to the outreach committee allows each visit to be tailored to the needs and expectation of the teacher. It also provides an excellent forum for a balanced presentation of our available career programs. The value of the opportunity to introduce these young science students to the new technology, as well as give them first hand knowledge of career opportunities, cannot be overstated. For example, over the past two years entire high school biology classes have participated in carefully coordinated laboratory demonstrations that would have been impossible to perform at their local schools.

Off Site

Despite the success of the visitation program, most elementary, middle, and senior high schools cannot sanction off-campus visits by their students because of transportation and class scheduling problems. It becomes very important, therefore, that our outreach program include visits by our faculty and students to the precollege classrooms. Such visits provide excellent opportunity to share the excitement of a career in science and biology with students who are at the formative stage of their education. If possible a visiting team will include a faculty member and/or student who have an affiliation with that school or region. Periodically, a financial aid officer will be included to reassure students that career choices are not limited by financial considerations. Sufficient technical equipment to perform investigative type experiments designed to enhance their curriculum activities will be brought directly to the classroom. The faculty or student in charge of the demonstrations will be proficient at conducting the proposed experiments and conversant at the appropriate educational level. In fact, professional students make excellent ambassadors for the existing health-related programs and will be integral members of any visitation team. Packets containing brochures describing various career opportunities and simple laboratory type protocols will be prepared and distributed to each teacher.

Teacher Workshops

The most significant player in the effort to improve science education is always the classroom teacher. In the final analysis, it is his/her sense of enthusiasm and innovativeness that attracts students to the discipline. Therefore, our program is including summer workshops, for science/biology teachers using the facilities of the University and the Medical Center. These workshop are designed to upgrade the teachers biological knowledge through lecture and laboratory exercises. A great deal of time is spent discussing ways in which a teacher can be more innovative given limited resources and facilities. Developing and sustaining a positive attitude toward science is a prime goal of the workshop. Our experience has been that faculty frequently become consultants to individual participants and continue to interact over the next several years. The faculty for the workshops donate their time, which has made this a high yield/low cost endeavor.

Research Opportunities for Teachers and Students

Unfortunately, summer research opportunities can only be provided for interested high school students and/or teachers on a limited basis. The limiting factor is generally the lack of funds to provide adequate stipends. Nevertheless placing high or junior high school teachers in active research laboratories is one of the best vehicles to instill an appreciation of investigative research. The final objective is not to turn these teachers into scientists but to enhance their ability to share their first hand experience with students. More state and federal funds need to be allocated for this extremely significant training experience.

Summary

Institutions of higher learning and their faculty must make a significant commitment to participate in the revitalization of the science curriculum. An active science outreach program within colleges and universities can have a pronounced impact on science education at relatively little expense. This partnership requires time, energy, and the willingness to share one's dedication and enthusiasm for his/her vocation.



K-12 Biology Teaching In Need of Reform

Today's students are not learning biology, appreciating its importance in their lives or pursuing it as a career, many educators believe. And it's no wonder, according to a recent Research Council report!

Biology education in the United States, from the early grades through high school, is hampered by poorly trained and supported teachers, a curriculum that "seems designed to snuff out interest," inappropriately used standardized tests, and textbooks that are often inaccurate and misleading, the report says.

The few recent innovations in science education "remain local and isolated contributions, unguided by any overarching plan, unaccompanied by any independent assessment, untouched by any means of propagation, and, hence, ephemeral." Sustained reform is necessary, it adds.

The committee of biologists and educators that wrote the report recommended a sweeping agenda of reform, including better undergraduate and inservice training for biology teachers. It also urged development of a relevant curriculum that begins in early elementary school with natural science, continues in middle school with human biology, and presents core concepts in biology to high schoolers.

Better-written, contemporary textbooks in biology that emphasize concepts rather than terminology should be developed, it added, and tests should be created that measure more than mastery of an arcane technical vocabulary.

Permanent Organization

The changes necessary to bolster biology education "cannot be made unless there is a permanent organization to monitor and organize them," the committee stressed. It urged the Research Council to establish a standing board or commission responsible for development of new curricula; standards for textbook writing, review and selection; and criteria for teacher certification and inservice training. It also would identify research needs for science education and foster cooperation between school teachers, colleges and universities, school administrators and others.

The new board would complement the work of the Research Council's Mathematical Sciences Education Board and the National Science Resources Center of the National Academy of Sciences and the Smithsonian Institution.

"This report is about complex relationships," notes study committee chair Timothy H. Goldsmith, Department of Biology, Yale University, New Haven, Conn. "It's about how failure of learning in high school science has its origins in elementary school, how texts, tests, teacher education, colleges and universities and political and economic assumptions all contribute to the status quo, and how difficult it is to alter one element and expect any meaningful change in the entire system."

In this way, he said, "the report is about the *ecology* of science education."

State of Biology Education

Biology plays a critical role in the K-12 science curriculum, the committee noted. It is usually the first science class that students take, and can "make or break" a student's interest in the sciences, it said. Solid preparation in biology during their school years also helps adults lead healthier lives and make important environmental and other decisions.

For most U.S. pre-college students, their first exposure to biology education comes in middle school; about 75 percent of all students go on to take a high school biology class. Only 30 percent of those students continue with science by studying chemistry, and only half of the chemistry students take a high school course in physics. "When only 15 percent of the kids stay with science through the 12th grade, they are clearly voting with their feet," Goldsmith said.

Fully half of the students who never take a class in biology do as well as or better on biology tests than 40 percent of biology-class graduates. "Clearly, a great many children are learning almost nothing in their biology courses," the committee concluded. "Most students leave the experience with the conviction that further exposure to science is something to be avoided if at all possible."

Wilma Toney, a committee member who teaches biology at Manchester (Conn.) High School, said she sees the effect of this avoidance every day in the students she teaches. "Kids in our early elementary grades are filled with questions about the world they live in and how it works. But by the time I get them, clearly something has gone wrong; the spirit of scientific inquiry is missing. The something that has gone wrong is how science has been taught to them."

The Curriculum

Science should be presented "in the earliest years of elementary school," the committee said. Biological science presented to young children should have nature study as a focus and be integrated with other subjects.

This isn't happening now, said committee member Jane Kahle, former president of the National Association of Biology Teachers and a professor of science education and zoology at Miami University of Ohio. The typical K-6 school day includes less than a half-hour total of science-related material, she said. And even that is almost entirely lecture or reading, with no opportunity to provide critical handson activities for students.

¹Fulfilling the Promise: Biology Education in the Nation's Schools. Committee on High-School Biology Education, Board on Biology, Commission on Life Sciences (1990, 152 pp.; ISBN 0-309-04243-7; available from National Academy Press, \$14.95 plus shipping).

The situation doesn't improve much in the middle grades, Goldsmith notes. "The middle school curriculum is an orphan that fails to capture the interests and needs of the young adolescent and makes its own contribution to killing interest in science," he said.

Middle-school biology education should take advantage of adolescents' natural curiosity about health, hygiene and disease, the committee recommended.

At the high school level, "the curriculum [should be] pared of everything that does not explicate and illuminate the relatively few concepts" deemed essential to understanding biology.

"The entire curriculum," Goldsmith summarized, "needs to emphasize science as a process of understanding, an openended game of 'What if. . . ?' and 'What else could that mean?' It should not be a stupefying exercise in memorizing terminology."

Teachers

"We do not have a teaching corps trained for the task" of teaching science in the elementary schools, the committee said. Liberal arts colleges discourage their best students from teaching science, schools of education "present pedagogical information so unrelated to the specifics of teaching science as to be of little help," and college science programs prompt their best and brightest to avoid teaching for research or academic careers.

Until a cadre of elementary school teachers can be adequately prepared or retrained, one short-term solution suggested by the committee is supplementing elementary education with science specialists – teachers who teach only or primarily science subjects. In addition, every high school biology teacher should have had a chance to engage in original research under the direction of a research scientist. Once on the job, teachers should be given time, support and encouragement to continue studying science.

Textbooks

Available textbooks are "poorly structured," often "abysmally crafted," and are written less to satisfy a student's knowledge requirements than they are to "[avoid] offense to a scientifically illiterate segment of the adult population," the committee said. It recommended shifting control of textbook content from publisher to author and requiring an extensive review of science texts by the scientific community before textbooks are marketed. "Particular care should be given to designing smaller texts" around important biological concepts, it added.

There is an important task for the science community in writing and reviewing biology texts, Goldsmith pointed out. "Under the present system, the influence of scientists in the production of textbooks for precollege curricula is inadequate and not particularly welcome by the publishers. This simply must change."

But scientists' responsibilities to biology education don't end there. "Individually, many scientists have worked to improve education," Goldsmith said. "Collectively, however, the profession has been too aloof from their dedicated colleagues in the schools. We see a vital need for partnership with the education community if we are to help develop and guide a successful educational program for our nation's schools." Rick Borchelt

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| Future Meetings | | | | | | |
|---|---|--|--|--|--|--|
| 1991 APS Conference: From Channels to Cross Bridges | July 13-16 Bar Harbor, ME | | | | | |
| APS Conference: Interactions of the Endocrine and Cardiovascular Systems in Health and Disease | September 29-October 3 San Antonio, TX | | | | | |
| 1992 FASEB Spring Meeting | April 5-10, Anaheim, CA | | | | | |
| APS Conference: Integrative Biology of Exercise | September 22-26, Colorado Springs, CO | | | | | |
| APS Conference: The Cellular and Molecular Biology of Membrane Transport | November 4-10 Orlando, FL | | | | | |
| 1993 FASEB Spring Meeting | March 28-April 1, New Orleans, LA | | | | | |
| 1994 FASEB Spring Meeting | April 24-29, Anaheim, CA | | | | | |

Nutrition and the Origins of Disease Charles Halsted and Robert Rucker (editors) Academic Press, Inc. 1989, \$49.95.

It is noted by the series editor of the Bristol-Myers Nutrition Symposium, Jerry L. Moore, that although the pace of discovery of essential nutrients has slowed, progress in understanding the role of most nutrients is accelerating. Thus, it is appropriate to select a group of 23 distinguished clinical and research specialists, as Charles H. Halsted and Robert B. Rucker have done, to discuss the role of nutrition in the maintenance of health and prevention of treatment of disease.

Two important events have occurred with regard to the material on nutrition in health. First, considerable research has been accomplished. Bristol-Myers has contributed generously to this research effort by providing a medical research grants program. The same company has contributed also by sponsorhip to symposia. The papers herein reflect the proceedings of the Seventh Annual Bristol-Myers Symposium on Nutrition Research, organized by the University of California at Davis and held September 1987 in San Francisco. The publication of proceedings of such symposia represent an important final event in bringing this material before the largest audience possible.

This symposium and the research that led to it are further justified by the co-chairpersons, by pointing out that it has recently become recognized that several of the most common diseases, including those with highest mortality, are intrinsically related to one's diet. These include various forms of cardiovascular disease, cancer, hypertension, diabetes and alcohol/liver disease. The frontier of molecular biology is also being applied to nutritional science, for example in determining how specific segments of a gene result in expression of proteins and enzymes involved in transport and metabolism of nutrients. The effect of nutritional deficiencies on maintenance of DNA structure is also of value in understanding the rapid turnover in neoplastic cells.

Most chapters in this book address a topic limited in scope and are appropriately brief, averaging 17 pages including references. Because the topics are so diverse, there is not a great amount of specific material gleaned from one chapter that is subsequently recalled and used in the following chapters. Some welcome exceptions to this trend do occur; for instance, in the chapter that describes the molecular biology of the relationships between micronutrients and disease, zinc is discussed as a prototype nutrient. The sensitivity of the metallothionein gene expression to dietary zinc suggests that cellular factors monitor plasma or intracellular zinc levels and regulate transcription accordingly. The concept that "metal regulatory elements" activate transcription of factors that bind zinc may be applied to other nutrients. As is often the case in biomedical research, it is difficult to extrapolate the results of the current studies on experimental animals to the concern of human disease. The author provides us expectation that developing techniques will be of value. This chapter is one of the few in which the emerging concept is discussed that several human diseases may be the result of free-radical formation. The discussion of an anti-oxidant role of metallothionein is therefore a helpful and current aspect of this chapter.

Other chapters include summaries of conclusion that could have been written years ago. For instance, the description of the pathogenesis of megaloblastic anemia suggests that vitamin B_{14} deficiencies most frequently result from age-dependent gastric atrophy, which leads to inadequate vitamin B_{14} absorption and then pernicious anemia. This reader was therefore somewhat surprised to find that the references in this chapter are more recent than in most other chapters; 71% were published between 1985-1989. In many other chapters the percentage of recent references is lower, in one case being as low as 9%. Thus, old topics maintain our interest if they continue to be of clinical importance and if new approaches are used in their investigation. The chapter on omega-3 fatty acids and lipoprotein regulation contains abundant data that suggest consumption of fish may lower plasma triclycerides in patients with certain types of hypertriglyceridemia more than a very low-fat diet. In view of the recent interest in the use of dietary omega-3 fatty acids by the lay community, it is curious that so few of the references in this chapter (11%) appeared in 1985 or later.

Several chapters share the related themes of regulationadaptation. The chapter on regulation of carbohydrate homeostasis in diabetes mellitus is helpful and current. It gives an evaluation of the "sleeping liver" hypothesis as it applies to pathophysiology of type I diabetes; the model appears to reconcile several apparently disparate clinical observations.

Nutrient regulation of intestinal hydrolases is discussed as evaluated in rats. Two mechanisms of dietary regulation apparently allow local modulation of the hydrolytic capacity of the enterocyte in response to changes in nutrients present at the luminal surface. This material is complementary to the observations of Jared Diamond and co-workers who have studied responses in brush-border transport of sugars in response to dietary carbohydrate intake. The related topic of intestinal adaptation to parenteral nutrition is discussed in a rat model. The adaptive response is complex, involving an ileal-enteric feedback mechanism for control of mucosal growth. The role of gastrointestinal hormones in adaptation is covered in 11 pages. Given the complexity of interaction between the various gut hormones, it is not surprising that "it is difficult to determine the physical actions specific to any single hormone or peptide." This topic would be better suited to a more complete review.

Pathogenesis of obesity is discussed without reference to very much of the voluminus original data and observations. Instead, models of the disorder are discussed because they are considered to be useful as new therapeutic approaches. A second chapter on obesity addresses genetic influences on metabolic rate as an important contributing factor. Thus, individuals with a reduced rate of energy expenditure are considered to have "essential obesity."

In summary, the individual chapters are well written accounts of how we currently view the role of nutrition in select disorders. This reviewer was somewhat disappointed at the minimal emphasis placed on the role of nutrition in anti-oxidant defenses. Perhaps this material is being saved for a future symposium that could bring together a group of investigators who would evaluate how nutrients protect us against free radicals that are considered to promote disease.

> Richard C. Rose Department of Physiology University of North Dakota School of Medicine

APS ACCEPTS VISA AND MASTERCARD FOR PAYMENT OF DUES AND SUBSCRIPTIONS

Microvascular Mechanics: Hemodynamics of Systemic and Pulmonary Microcirculation J. S. Lee and T. C. Skalak (editors) Springer, New York, 1989, \$59.00

The 13 chapters in this volume are based on a symposium entitled, *"Frontiers of Cardiopulmonary Mechanics,"* which was held in honor of Ernst O. Attinger and the 20th Anniversary of the Department of Biomedical Engineering at the University of Virginia in 1988.

I have strong reservations about reviewing symposia volumes because the plot doesn't hang together and the characters are onedimensional, although the setting is attractive. Seriously, the plot of this book is to describe the current status of microvascular mechanics of the systemic circulation (6 chapters) and of the pulmonary circulation (7 chapters). Since several leading physiologists and bioengineers of both circulations were not present, the coverage is limited. Nevertheless, there are some interesting chapters.

In the section Systemic Microvascular Mechanics the best chapter was by Pries and Gaehtgens on the basic physiological description of blood cell dispersion in microvascular networks. Unfortunately, that introductory chapter comes toward the end of the section. It seems to me that one of the editor's jobs is to arrange the chapters in an orderly fashion, regardless of how they were presented at the symposia.

Another interesting chapter is the bioengineering analysis of blood flow in resting skeletal muscle by Geert Schmid-Schoenbein and associates. They deserve great credit for the patience, work, and dedication devoted to completely describing the microvascular network of one small skeletal muscle (Gracilis). The description is well done, and I have no criticism of either the style of presentation or the results. However, having just read some papers on fractal analysis of vascular networks, I think the whole thing would have been much easier to do by that approach, which is much less labor-intensive.

Overall, the systemic mechanics section is devoted to quantifying the distribution and flow of particles (erythrocytes) or plasma in microvascular network. But is the cost, effort, and time worth it? What fundamental questions will be answered? In the symposium volume, too much attention is devoted to means (methods) rather than ends (science). It gives to microvascular mechanics and bioengineering a rather distorted image.

In the section Pulmonary Microvascular Mechanics considerable attention is devoted to the theoretical analysis of indirect measurements of mean pulmonary capillary pressure by venous and arterial occlusion techniques or by altered viscosity bolus injections. The review by Linehan and associates of their recent theoretical work is interesting and precise. It includes a brief explanation of their major premises. The thing that bothers me about this chapter and also of that of Dawson and co-workers on the low viscosity bolus technique is trying to interpret what the mean capillary pressure may signify. It has been shown repeatedly that transmural hydrostatic and protein osmotic pressures vary considerably from the top to the bottom of the lung and also under a variety of conditions. Just take, for example, the concept of mean capillary pressure in a lung that may be 25 cm high (human). Suppose the mean capillary pressure is 10 or 12 cmH₂O. What does it signify? Clearly the vessels at the bottom is 10 or 12 cmH_2O . What does it signify? Clearly, the vessels at the bottom of the lung have a much higher pressure than that. It reminds me of the old isogravimetric pressure technique (referred to in the chapter by Barman and colleagues). What does it mean in a lung with a distributed microvascular bed to say that there is an isogravimetric pressure. How can that be? Aren't the capillaries at the bottom of the lung filtering, while those at the top are reabsorbing? It's a difficult problem; one I wish bioengineers and physiologists would face in a more realistic manner.

I don't know what to make of the new method described by Lee and Lee (chapter 10) on cyclic variations in the density of arterial blood measured by a device called a Density Measuring System. Although most of this chapter is devoted to the method and its theoretical basis, the authors give some summary data from rabbits and dogs in which they claim to have shown a cyclic variation in pulmonary capillary volume of the order of 4% within a breathing cycle. If that is scaled to the human lung, it suggests a variation of ± 4 ml out of a capillary volume of about 70 ml at rest. There appears to be much less here than meets the eye, especially when one of the earlier chapters mentioned a much simpler method for measuring blood density (hematocrit) by changes in electrical resistance.

I've learned something new from Wagner's chapter in which he summarizes 25 years direct observations of the pulmonary microcirculation through his unique pleural window. He reports that Stephen Hales made an estimate of capillary transit time of red cells in 1733. The embarrassing part of it all is that Hales' results are almost as good as those presented in this book. Another interesting thing is Wagner's statement that in spite of 25 years of studying the dog lung microcirculation, he has yet to see a lung surface microvessel constrict. Wagner presents some interesting data on the vertical gradient of capillary flow rate at the top and bottom of the lung under various conditions; results making shreds of the notion of mean capillary measurements.

The last two chapters deal with modeling of the complete pulmonary circulation in the cat and its possible extension to human's based on the quantitative histological analysis.

In summary, I don't object to any of the specific chapters in this book, but the methods seem to be getting extremely complicated without giving improved information. As the instrumentation and its theoretical basis gets more and more complex, the problem to be solved appears to fade into the background. I don't think that's what the editors had in mind but that's what I got from reading the book.

I must say some additional words about the quality of editorial control over the presentations. The book contains some odd juxtapositions of contradictory data. Were any of these discussed at the meeting? There is nothing to suggest that any of the investigators paid attention to what anybody else said. For example, in the 13th chapter, Fung refers to a significant resistance in the alveolar wall capillaries, whereas Linehan (chapter 8) finds resistance in the capillaries to be trivial. Some of the workers continue to model the microcirculation on the concept of sheet flow, which is at variance with Wagner's direct analysis showing flow in individual capillaries. Is capillary resistance high or low? Are the capillaries sheets or tubes? You won't find out reading this book.

At \$59, the book is reasonably priced and may prove useful as a library reference on some aspects of microvascular dynamics.

> Norman C. Staub Cardiovascular Research Institute University of California, San Francisco

Comparative Physiology, Vol. 2: Urinary Concentrating Mechanisms

R. K. H. Kinne (editor) Basel: Karger, 1989, 148 pp., illus., \$88.00.

This short book is a collection of three articles, each concerned with a separate aspect of mechanisms involved with the concentration of urine. Each article is written by an author who has distinguished himself in the particular area of research emphasized in the discussion. In general, the text is written for the initiated rather than the novice renal physiologist. While some comparative aspects of the physiology of urinary concentrating mechanisms are addressed in the first article by Richard Hays, the major emphasis of the book is mammalian physiology.

In the first chapter, Hays gives a very personal view of water transport in epithelia. He begins with a review of the general principles of water movement across cell membranes and a brief discussion of the evolution of water-transporting systems, including regulatory hormones, in species ranging from marine cyclostomes to mammals. In Table 2, he contrasts the structures of the neural lobe hormones and then discusses their influence on water transport in 1) teleosts, 2) amphibia, and 3) mammals. However this is not a comprehensive picture of evolutionary trends because there is almost a total lack of description of reptiles and birds. The major emphasis of the chapter is on the transport of water across the amphibian urinary bladder, which is a model epithelium for the mammalian inner medullary collecting duct. The discussion centers on the different antidiuretic hormone receptors, the putative role of an oxytocin receptor in the nephron, and the two major pathways of signalling in the cell: the adenylate cyclase pathway and the phosphoinositide pathway. While a few of the tables and figures have captions that are different to follow and the information concerning the V_2 receptor is already dated (recent evidence for the internalization of the V₂ receptor has been published), the overall text of this chapter is well written and enjoyable to read. Hays concludes with the challenges ahead: the delineation of hormonal signalling, the purification and characterization of the water channel, and the further investigation of the evolution of neurohypophysial peptides.

Of the three articles, de Rouffignac gives us the broadest and most complete view of the urinary concentrating mechanism. The data reported are from studies performed primarily in rodents with significant capacities for osmoregulation. He begins with a segmental review of the urinary concentrating mechanism, starting with the descending loop of Henle and ending in the inner medullary collecting duct. While the important work of Imai and colleagues on the permeability properties of the thin limbs receives only passing reference, the article provides an excellent and comprehensive description of renal medullary function. The presentation is clear and concise and can be easily read by the novice physiologist. De Rouffignac, in the cond section of his article, discusses the hormonal control of urinary concentration, including effects of parathyroid hormone, calcitonin, vasopressin, glucagon, and isoproterenol. Because much of this work was performed in the author's laboratory, the text is quite detailed and the data presented can become somewhat overpowering to the first-time reader. Chronic adaptations to extremes of environment are presented in terms of morphological changes and their functional consequences. The value of multiple hormonal control of the thick ascending limb functions is explored and data from hormone-deprived rats is reviewed. In the third major section, the author addresses various aspects of medullary recycling with respect to the corticopapillary osmotic gradient and skillfully uses several excellent diagrams to

explain the concepts. In the last section of his pape, de Rouffignac discusses possible anatomical factors that might influence the capacity of an animal to concentrate: papillary length, the number of nephrons, the percentage of long loops, the heterogeneity of nephrons, the development of medullary zones, and "inner medullary insulation" due to countercurrent exchange in the vascular bundles of the outer medulla. All of these in one or more species show some correlation with concentrating capacity, but the author emphasizes the last as the most important. The evidence for this morphological "insulating factor," however, is based more on theory than on quantitative physiologic data.

Bodil Schmidt-Nielson, in the third article, function of the pelvis, purposes that urinary reflux in the renal pelvis and pelvic contractions that squeeze the papilla have significant effects on urinary concentration in mammals. In the first part of the paper, anatomical relationships between the renal pelvis and the renal medulla of a wide variety of mammals are explored. The author begins with a section on terminology and then illustrates the variety of renal pelvic anatomy from pictures of casts and drawings that have been taken from other publications. For those unfamiliar with the work and for those who have not dissected the kidney, the threedimensional visualization required to understand the text may be difficult. For the initiated, this is a marvelous review that includes the nature of the epithelia lining all portions of the renal pelvis. Physiological characteristics of the pelvic epithelium are compared with those of the collecting ducts. In the second section, the author reviews the characteristics and control of pelvic peristalsis, and then describes the effects of these contractions on fluid movements in the papilla. She discusses the effects of pelvic peristalsis on the concentrating mechanism and correlates pelvic anatomy with the ability of desert rodents to cope with large changes in water intake. While extensive quantitative data are lacking, the effects of pelvic peristalsis on papillary structures are convincing enough to warrant serious considerations and further research on their effects on urinary concentraion.

Michael F, Flessner, Bruno Flamion, Patricia Wright, C-L Chou, Scott Lankford, and Mark A. Knepper Laboratory of Kidney and Electrolyte Metabolism National Heart, Lung, and Blood Institute

The Return of Blood to the Heart: Venous Pumps in Health Disease

A.M.N. Gardner and R.H. Fox

London: John Libby, 1989, 184 pp., illus., index, \$49.00

Venous return to the heart is an important but often overlooked concern both from basic science and clinical viewpoints. This book provides eight chapters that emphasize the venous system and how it functions in normal and diseased states. After brief introductory and historical sections, the authors include 1) methods of investigating the venous system with a section on Doppler ultrasound written by R. H. Morgan, 2) circulatory physiology from the microcirculation to compartment syndromes (where high intramuscular pressure prevents normal blood perfusion through the involved skeletal muscle) and lymphatic return. 3) physiology of peripheral and central veins, 4) venous pathology, 5) possible use of intermittent pneumatic compartment syndromes, and heal bones, and 6) hemodynamic principles of blood flow through collapsible tubes, written by D. J. Griffths. The book also includes six appendices written by M. C. Beverly and J. J. Pflug covering I) peripheral venous embolism, 2) testing incompetent perforating veins. 3) post-traumatic pain and pH, 4) deep venous thrombosis in the foot and hand, 5) bone blood pump, and 6) conservative care of venous insufficiency. A bibliography of 588 references follows the appendices.

Although the book emphasizes clinical diagnosis and management of venous disorders as reflected by the surgical and radiologic backgrounds of the authors, Gardner and Fox, several new viewpoints and hypotheses are discussed that have broader basic relevance to cardiovascular physiology. Foremost among these is the existence of a venous plexus in the sole of the human foot that, in conjunction with leg muscle pump, propels blood upwards against a gravitational pressure gradient during ambulation. The authors have taken this basic concept forward to the development of a pneumatic foot pump for treating edema and pain in legs of immobilized patients. Although the authors' instrument passively activates the venous foot pump, most of the evidence provided to document the efficacy of the device in patients following trauma and surgery is anecdotal in nature or unpublished results (Chapter 7).

Some statements in the book are not well founded. For example, the authors suggest that the arteriovenous pressure gradient governs microcirculatory flow (p. 30). In fact, many other mechanisms importantly determine microvascular perfusion. Also, lymphatic pressure is often positive, contrary to that stated on pages 25 and 40. Both passive and active stretching of leg muscles con-

tributes to venous return and orthostatic tolerance, besides the compression of the venous pump of the foot advocated by the authors (p. 50). The authors suggest that limb elevation does not alter the arteriovenous pressure gradient (p. 53). However, it is generally agreed that limb elevation lowers local arterial pressure while venous pressure can not decrease below local tissue pressure. Some references are old or missing. For example, recent papers concerning intramuscular pressures during exercise or passive stretch are not included (pp. 59 and 68).

In summary, however, the value of the book in terms of providing original and important ideas on venous return far outweigh the above-identified problems. The text is well illustrated and the chapter written by Derek Griffiths on flow principles in collapsible tubes is excellent. Overall, the book will foster new and exciting ideas for understanding venous return and treating patients with venous disorders. We recommend this book for circulatory physiologists and clinicians who treat posttraumatic and postoperative limb swelling.

> Jorma Styf Department of Orthopaedics East Hospital, Gotëborg

Alan R. Hargens Life Science Division NASA-Ames Research Center

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