THE PHYSIOLOGIST

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EDITORIAL

A Question Worth Asking?

Once again it appears that the budget of the National Institutes of Health has been miraculously spared the surgeon's knife. Gramm-Rudman-Hollings not withstanding, Congress has voted to appropriate $7.679 billion for NIH, a 7.5% increase over FY 1989 and 2% more than the president's request.

The congressional action was more positive than anticipated because funds were not earmarked for AIDS-related research. In addition, $24.6 million was added to the president's request for the National Research Service Award program to allow for the support of approximately 11,200 training positions.

Unfortunately, the numbers for research awards are not so favorable. Although NIH will be supporting nearly 23,000 projects in 1990, the numbers for new and competing awards will be well below the approximately 6,300 funded several years ago. Even with downward negotiations of 10–15%, the NIH appropriation will only result in 4,500 new and competing renewal awards.

Can the biomedical research community be expected to continue to pursue innovative research and to train new generations of scientists if funding rates remain in the 20% range? It is my view that the answer is a resounding no.

At a time of shrinking federal allo-

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Project 2061: *Science for All Americans*

Science for All Americans is about scientific literacy. It consists of a set of recommendations by the National Council on Science and Technology Education—a distinguished group of scientists and educators appointed by the American Association for the Advancement of Science—on what understandings and habits of mind are essential for all citizens in a scientifically literate society.

Scientific literacy—which embraces literacy in science, mathematics, and technology—has emerged as a central goal of education. Yet the fact is that scientific literacy eludes us in the United States. A cascade of recent studies has made it abundantly clear that by both national standards and international norms, US education is failing to adequately educate too many students—and hence failing the nation. The reform of science, mathematics, and technology education must rank as one of America's highest priorities.

Scientific societies have responded to this challenge in many ways. As one such response, the American Association for the Advancement of Science has initiated Project 2061, a long-range, multiphase effort designed to help the nation achieve scientific literacy. It was started in 1985, a year when Comet Halley happened to be in the earth's vicinity. That coincidence prompted the project's name, for it was realized that the children who would live to see the return of the comet in 2061 would soon be starting their school years.

Project 2061 is based on these convictions:

- All children need and deserve a basic education in science, mathematics, and technology that prepares them to live interesting and productive lives.
- World norms for what constitutes a basic education have changed radically in response to the rapid growth of scientific knowledge and technological power.
- US schools have yet to act decisively enough in preparing young people—especially minority children, on whom the future of America is coming to depend—for a world shaped by science and technology.
- Sweeping changes in the entire educational system from kindergarten through

Project 2061: Science for All Americans was released by the American Association for the Advancement of Science in March 1989. It represents a call for reform of education in science, mathematics, and technology. This article represents an excerpted summary of the report. For information about ordering the overview report and five panel reports, please contact Project 2061, AAAS, 1333 H Street, N.W., Washington, D.C. 20005.

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EDITORIAL

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cations, we, as scientists, should be making suggestions on how additional funds can be channeled to the alleviation of human disease and suffering. No doubt many of us would suggest that one less stealth bomber be built. But even with improved relations with the Soviets, this appears to be an unlikely possibility.

A more likely possibility is NIH's proposal to cap the salary of NIH grantees at $120,000. Previously, the National Science Foundation had implemented a similar proposal, although at a lower level ($95,000), for its grantees.

The proposed pay cap, however, was rejected by Congress probably because the $120,000 cap would have only yielded $10.4 million, or the ability to issue an additional 52 research grants. Indeed, NIH concluded in its report that "this provision might allow flexibility in the severity of the mandated grant 'downward negotiation' percentages utilized by the awarding components in meeting their appropriation requirements."

Obviously, Congress did not believe that a $120,000 cap would produce the desired effect. Indeed, even NSF and the National Science Board is questioning whether their current cap is enough to ensure broad support of the scientific community and its research. According to the Board, dropping funds for academic-year salaries would free up scarce funds to support graduate students and postdoctoral fellows.

However, a more drastic measure might be warranted if NIH is to fund an increasing number of awards. Perhaps NIH should adopt the policy of the Canadian Research Council and not fund the salaries of the principal investigator. As is obvious, the potential impact on our universities and research centers would be significant and the policy could not be implemented overnight.

No matter what the impact on the research universities, the question must be asked whether such a policy would produce any benefit. Obviously, universities would be put on notice that the federal government views research as an integral part of a faculty member's job and must be supported by the university. Smaller colleges and universities, with hard money positions, would be able to attract researchers to their campuses. These active scientists could then serve as role models for students not previously exposed to research. Indeed, the presence of active scientists on these campuses might stimulate interest in science and serve to increase the numbers of students pursuing careers in science.

Aside from the potential benefits listed above, eliminating support for principal investigators' salaries would provide additional funds for research. According to NIH, the average cost for competing grants is approximately $200,000. Of that amount, salaries account for 62%, or $124,000. Principal investigators' salaries account for 30% of the total salary requested, or $37,000. Based on the 22,014 FY 1988 grant awards, the potential reduction in requested budgets would be $815 million. This would translate into the ability to issue 5,000 additional research grants.

Do the benefits of eliminating principal investigators' salaries from research grants warrant a change in NIH policy? While it is not a change the scientific community can make, it is a question worth asking.

Martin Frank

SCIENCE FOR ALL AMERICANS
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twelfth grade will have to be made if the United States is to become a nation of scientifically literate citizens.

• A necessary first step in achieving systematic reform in science, mathematics, and technology education is reaching a clear understanding of what constitutes scientific literacy.

But educational reform cannot simply be legislated. It will take time, determination, collaboration, resources, and leadership. It will take daring and experimentation. And it will take a shared national vision of what Americans want their schools to achieve. *Science for All Americans*—part of an AAAS initiative called Project 2061—is intended to help in the formulation of that vision.

The Current Situation

Most Americans are not scientifically literate. One only has to look at the international studies of educational performance to see that US students rank near the bottom in science and mathematics—hardly what one would expect if the schools were doing their job well. The most recent international mathematics study has reported, for instance, that US students are well below the international level in problem solving, and the latest study of National Assessment of Educational Progress has found that despite some small recent gains, the average performance of 17-year-olds in 1986 remained substantially lower than it had been in 1969.

The United States should be able to do better. It is, after all, a prosperous nation that claims to value public education as the foundation of democracy. And it has deliberately staked its future well-being on its competence—even leadership—in science and technology. Surely it is reasonable, therefore, to expect this commitment to show up in the form of a modern, well-supported school system staffed by highly qualified teachers and administrators. And surely the curriculum in such schools should feature science, mathematics, and technology for all students. In fact, however, the situation existing in far too many states and school districts is quite different:

• Few elementary school teachers have even a rudimentary education in science and mathematics, and many junior and senior high school teachers of science and mathematics do not meet reasonable standards of preparation in those fields. Unfortunately, such deficiencies have long been tolerated by the institutions that prepare teachers, the public bodies that license them, the schools that hire them and give them their assignments, and even the teaching profession itself.

• Teachers of science and mathematics have crushing teaching loads that make it nearly impossible for them to perform well, no matter how excellent their preparation may have been. This burden is made worse by the almost complete absence of a modern support system to back them up. As the world approaches the twenty-first century, the schools of America—when it comes to the deployment of people, time, and technology—seem to be still stuck in the nineteenth century.

• The present science textbooks and methods of instruction, far from helping, often actually impede progress toward scientific literacy. They emphasize the learning of answers more than the exploration of questions, memory at the expense of critical thought, bits and pieces of information instead of understandings in context, recitation over argument, reading in lieu of doing. They fail to encourage students to work together, to share ideas and information freely with each other, or to use modern instruments to extend their intellectual capabilities.

• The present curricula in science and mathematics are overstuffed and undernourished. Over the decades, they have grown with little restraint, thereby overwhelming teachers and students and making it difficult for them to keep track of what science, mathematics, and technology is truly essential. Some topics are taught over and over again in needless detail; some that are of equal or greater importance to scientific literacy—often from the physical and social sciences and from technology—are absent from the curriculum or are reserved for only a few students.

To turn this situation around will take determination, resources, leadership, and time. The world has changed in such a way that scientific literacy has become necessary for everyone, not just a privileged few; science education will have to change to make that possible. We are all responsible for the current deplorable state of affairs in education, and it will take all of us to reform it. Project 2061 hopes to contribute to that national effort.

Project 2061 and Scientific Literacy

Project 2061 involves a three-phase plan of purposeful and sustained action that will contribute to the critically needed reform of education in science, mathematics, and technology:

• *Phase I* focused on the substance of scientific literacy. Its purpose was to establish a conceptual base for reform by spelling out the knowledge, skills, and attitudes all students should acquire as a consequence of their total school experience from kindergarten through high school. *Science for All Americans* and the reports of the scientific panels are the chief products of this phase.

• *Phase II* involves teams of educators and scientists transforming *Science for All Americans* into several alternative curriculum models for the use of school districts and states. During this phase, the project is also drawing up blueprints for reform related to teacher education, teaching materials and technologies, testing, the organization of schooling, educational policies, and educational research.

• *Phase III* will be a widespread collaborative effort, lasting a decade or longer, in which many groups active in educational reform will use the resources of *phases I* and *II* to move the nation toward scientific literacy.

Recommendations

A fundamental premise of Project 2061 is that the schools do not need to be asked to teach more and more content, but rather to focus on what is essential to scientific literacy and to teach it more effectively. Accordingly, the national council's recommendations for a common core of learning are limited to the ideas and skills having the greatest scientific and educational significance for scientific literacy.

Science for All Americans is based on the belief that the scientifically literate person is one who is aware that science, mathematics, and technology are interdependent human enterprises with strengths and limitations; understands key concepts and principles of science; is familiar with the natural world and recognizes both its diversity and unity; and uses scientific knowledge and scientific ways of thinking for individual and social purposes.

The national council's specific recommendations constitute the bulk of the report. The first three chapters focus on the nature of science, mathematics, and technology as human enterprises, and on how they resemble and differ from one another. The next six chapters present basic knowledge about the world—the shaping of the physical setting, the evolution and characteristics of life forms, the dynamics of human society, and other key aspects of the world—as seen through the eyes of science and mathematics and as shaped by technology. The following two chapters set forth what people should know about great episodes in the history of the scientific endeavor and about key cross-cutting themes—such as systems, patterns of change, and scale—that enable people to understand how the world works. The final chapter of the content recommendations focuses on the habits of mind that are essential for scientific literacy.

The council's recommendations cover a broad array of topics. Many of these topics are already common in school curricula (for example, the structure of matter, the basic functions of cells, prevention of disease, communications technology, and different uses of numbers). However, the treatment of such topics tends to differ from the traditional in two ways.

One difference is that boundaries between traditional subject-matter categories are softened and connections are emphasized. Transformations of energy, for example, occur in physical, biological, and technological systems, and evolutionary change appears in stars, organisms, and societies.

A second difference is that the amount of detail that students are expected to retain is considerably less than in traditional science, mathematics, and technology courses. Ideas and thinking skills are emphasized at the expense of specialized vocabulary and memorized procedures. Sets of ideas are chosen that not only make some satisfying sense at a simple level but also provide a lasting foundation for learning more. Details are treated as a means of enhancing, not guaranteeing, understanding of a general idea. The council believes, for example, that basic scientific literacy implies knowing that the chief function of living cells is assembling protein molecules according to instructions coded in DNA molecules, but does not imply knowing the terms "ribosome" or "deoxyribonucleic acid," or knowing what messenger RNA is and how it relates to DNA.

The national council's recommendations include some topics that are not common in school curricula. Among these topics are the nature of the scientific enterprise, including how science, mathematics, and technology relate to one another and to the social system in general. The council also calls for some knowledge of the most important episodes in the history of science and technology, and of the major conceptual themes that run through almost all scientific thinking.

Bridges to the Future

Certain next steps are essential if the nation is going to make significant headway toward realizing the goals expressed in *Science for All Americans.* Those steps should reflect the following considerations:

- To ensure the scientific literacy of all students, curricula must be changed to reduce the sheer amount of material covered; to weaken or eliminate rigid subject-matter boundaries; to pay more attention to the connections among science, mathematics, and technology; to present the scientific endeavor as a social enterprise that strongly influences—and is influenced by—human thought and action; and to foster scientific ways of thinking.
- The effective teaching of science, mathematics, and technology (or any other body of knowledge and skills) must be based on learning principles that derive from systematic research and from well-tested craft experience. Moreover, teaching related to scientific literacy needs to be consistent with the spirit and character of scientific inquiry and with scientific values. This suggests such approaches as starting with questions about phenomena rather than with answers to be learned; engaging students actively in the use of hypotheses, the collection and use of evidence, and the design of investigations and processes; and placing a premium on students' curiosity and creativity.
- Educational reform must be comprehensive, focusing on the learning needs of all children, covering all grades and subjects, and dealing with all components and aspects of the educational system. It will also require that positive conditions for change be established and that public support for reform be sustained for a decade or longer.
- Reform must be collaborative. It must involve administrators, university faculty members, and community, business, labor, and political leaders, as well as teachers, parents, and students themselves.

In support of collaborative reform, *Science for All Americans* concludes with an agenda for action that suggests steps individuals, institutions, organizations, and government agencies can take to work together toward reform.

There are no valid reasons—intellectual, social, or economic—why the United States cannot transform its schools to make scientific literacy possible for all students. What is required is national commitment, determination, and a willingness to work together toward common goals.

APS Journals and the Science Citation Index

The "Science Citation Index" (SCI) is the single index providing the most broad-based coverage of scientific and technical literature. Of the estimated 30,000 to 50,000 scientific and technical journals published worldwide, fewer than 1,000 journals publish 90% of the significant literature. The SCI, published by the Institute for Scientific Information in Philadelphia, currently indexes more than 4,200 journals, including 49 in the category of physiology and 113 in the category of neuroscience, and has more than 30 years of information available. It provides multidisciplinary coverage from the general areas of agriculture, biology, and environmental sciences; engineering, technology, and applied sciences; medical and life sciences; physical and chemical sciences; and behavioral sciences.

The SCI is actually an integrated literature search system having four separate but related indexes. *1*) The *Citation Index* alphabetically lists the names of first authors whose works were cited during the period covered; it tells when and where those works were originally published. Below each cited document is a list of all recent articles citing that work. *2*) The *Source Index* is an author index to more than 600,000 items annually indexed in the SCI, including articles, letters, editorials, reports, and technical notes. *3*) *The Permuterm© Subject Index* is an alphabetically arranged index to all the significant words and word pairs used in titles of articles indexed in the SCI. *4*) The *Corporate Index* enables the tracking of research done by particular organizations or institutions and the accessing of published authors and their works by their corporate or academic affiliation. It also allows search by geographical areas.

The "Journal Citation Reports"[1] of the SCI use citation analysis to examine relationships among journals instead of among articles and authors. Items of particular interest include impact factor, ranking by times cited, immediacy index, and cited half-life. These terms are defined as follows. *Impact factor* is a measure of the frequency of citation of an average article in a particular year. *Times cited* is based on citations of articles and is a cumulation of the number of times a journal has been named in citation of different articles in references of individual source items. *Immediacy index* is a measure of how quickly the "average" article in a particular journal is cited and considers citations made during the year in which the cited items were published. *Cited half-life* is the number of journal publication years going back from the current year that account for 50% of the total citations given by the citing journal in the current year.

Rankings of the APS journals according to the terms just defined are shown in Table 1. The individual journals of the *American Journal of Physiology* are not ranked separately because, unfortunately, the name of the individual journal is often not given in a reference list and only the volume number of the consolidated AJP is provided by authors.

J. E. Salive

1. Institute for Scientific Information. *SCI Journal Citation Reports.* Philadelphia, PA: Inst. Sci. Info., 1987, vol. 19.

TABLE 1. Ranking of APS journals in the SCI Journal Citation Reports

Journal	Impact Factor	Ranking*	Ranking, Times Cited†	Immediacy Index	Cited Half-Life, yr
PRV	10.976	1st	205th	1.435	8.6
AJP	3.146	8th	16th	0.366	6.3
JAP	2.301	11th	60th	0.261	8.3
JN	3.162	7th‡	114th	0.769	8.2

*Of 49 physiology journals. †Of 4,300 scientific and technical journals. ‡JN also ranks 14th of 113 journals in the category of neuroscience.

American Physiological Society Endowment Fund

The APS Endowment Fund was established in 1977 to support programs for the development of physiologists and physiology; to encourage communication with other disciplines of science and the public; and to foster scientific and cultural relations with other parts of the world.

The APS Endowment Fund was established to encourage tax-deductible contributions or requests to the society at any time and in any amount, for specific or general purposes. Upon request, the society will provide to a donor or institution contributing a memorial gift a replica of the plaque bearing the name of the individual living or deceased in whose honor the gift was made. The family of or the individual being honored by a donation to the fund will be advised formally of the donor's name, unless the contributor specifically requests that the donation be anonymous.

Donations to the APS Endowment Fund or queries should be addressed to 9650 Rockville Pike, Bethesda, MD 20814.

News from Senior Physiologists

Letters to Roy O. Greep

Sheppard M. Walker reports that he and his wife, Chris, are keeping physically active and mentally intact. Chris goes to aerobic exercises twice a week and is active in three organizations, and he plays golf and goes to his office at the University of Louisville to read papers of interest.

George Stavraky and his wife both are in good health and enjoy their retirement by traveling extensively. They also spend their winters in the Florida Keys and their summers in northern Ontario, where they have an island in Lake Temagami.

"Since I retired in 1987 I have been oscillating between our places in Florida and California," writes **Richard Bobb.** "I find I spend most of my time in California – more things to do and a better climate."

"I still have an appointment (volunteer) at UC-Irvine where I am working (transcutaneous and pulse oximetry) on pigs for the first time. Although they would suit our program better, we are not using dogs because of their cost – around $600. Ironically, just two blocks away at the pound they are killing them several times a week."

Donald Scott, Jr., and his wife have left the Philadelphia area and now are living in an old farmhouse in the town of Harvard, MA, which is 40 minutes from Harvard University, where he has been taking courses in different areas. "Just where this may lead is still uncertain," he says.

He has continued his direct contact with tribal areas in Zimbabwe regarding problems of conceptualization for science and mathematics understanding in secondary schools. In the last 40 years, he has made 10 trips to Zimbabwe to see what teaching aids used in the United States can be of value to students where measuring and counting are unfamiliar childhood activities. From one group of about 50 boys has come four MDs, three PhDs, one MD-PhD, and two engineers. One is a member of the government, two are professors, one serves a neighboring government, and one is a professor at the University of Connecticut.

"I am getting to be an expert on retirement after 15 years," **James Bradbury** reports. "For the first six years I taught endocrine block for 40 hours per year, so it was a nice transition from the 40 to 48 hours per week in the endocrine lab for 43 years. Now I get up to the (Montana State University) campus on Friday afternoons for biology seminars to see and hear topics of current investigations." He added that he and his wife, Katherine, both are in good health and that he still mows the lawn and works in the garden.

E. B. Brown and his wife have built a house near Fort Meyers, FL, in the same area where his son, an airline pilot, and his wife are building a winter home.

Letters to John Brobeck

The continued development of the international journal *Pediatric Pulmonary,* which he helped start, remains the central interest for **George Polgar,** who has returned to Philadelphia from Detroit. He also has time for consulting assignments at both the Children's Hospital of Philadelphia and as an honorary faculty member at the University of Pennsylvania Medical School, for writing an occasional editorial or book chapter, and for some travel, including an annual trip to native Hungary.

"I am still much more interested in ideas of other people, particularly of the new generation," he wrote. "Their growing concerns about remedying some of the 'sins' of our generation in allowing the degradation of our educational system, disregarding the deleterious effects of the preoccupation with the technological side of civilization, and with excessive consumption instead of prudent planning and saving for the future, is reassuring. Perhaps, one of the greatest rewards of having spent one's career centered on the care and well being of children is to remain more susceptible to young peoples' thoughts and feelings. They, in turn, by allowing us to occasionally present them with our recollections of the ways we got here, as a backdrop to their efforts, may satisfy us about not having lived in vain."

Gordon French writes that "I am about as retired as possible, short of interment." He notes that his horse farm and fox hunting in Unionville keeps him as busy as he wants to be and that he studies the *New England Journal of Medicine* weekly and is always astonished with what has happened since his years of formal training.

Letter to Horace W. Davenport

"Suffice to say that I have continued the role of a heretic," writes **Robert Alexander,** "having utterly abandoned the noble truths of physiology and become completely enthralled with colonial history. Indeed, I now carry an official title as 'Historian,' am a dues-paying member of several historical societies, and (curiously enough) find myself on prestigious mailing lists, which I would never have attained as a physiologist."

"The work schedule is about as heavy as ever; last year saw the publication of a 300-page monograph while so far this year one short paper has been published, three accepted for publication, and one in preparation. A modest lecture schedule also continues, which this spring has included presentations to classes from Williams College, the University of Kansas, and New Brunswick Theological Seminary. An interesting response to one recent lecture: 'When you retire, you should consider a second career on a university faculty.' "

APS Urges Bush to Reject Request of House Members to Give Silver Spring Monkeys to Animal Activists

Responding to a letter signed by 41 members of the House of Representatives, the American Physiological Society urged President George Bush not to instruct the Secretary of Health and Human Services to transfer the Silver Spring monkeys from the federally sponsored Delta Regional Primate Center in Louisiana.

The congressmen want the monkeys, currently under the guardianship of the National Institutes of Health, transferred to either Moorpark College in California or to Primarily Primates in Texas. The congressmen are supported in their effort by People Protecting Primates, a newly organized alliance of 80 animal activist groups with a primary purpose of obtaining custody of the monkeys.

Of the 17 monkeys confiscated by police in 1981 during a raid on a Silver Spring, MD, research laboratory, eight are at the regional center, three have died, and six are being socially rehabilitated at the San Diego Zoo. Their legal owners, the Institute for Behavioral Research, and a number of scientific societies, including APS, have been contributing to the financial support of the animals at the regional center. The cost for maintenance and rehabilitation of those at the zoo is being underwritten by a group of universities.

APS' letter urged the president to reject the request of the congressmen for both humane and scientific reasons.

Of the eight monkeys at the regional center, seven are suffering and two are in critical condition, and for humane reasons should have been euthanized some time ago, according to four panels of primate experts that have examined the animals. However, animal activists have secured from the federal courts in Louisiana restraining orders prohibiting the euthanizing of the animals.

APS also noted in its letter that the monkeys, if euthanized, could contribute in an unique way to research on how the brain reorganizes itself after neurological damage inasmuch as the opportunity to examine tissues nearly 10 years after deafferentation is unlikely to ever happen again. Such research would have direct application to stroke, brain injury, and peripheral nerve damage.

The text of the APS letter to President Bush follows.

August 23, 1989

President George H. W. Bush
The White House
1600 Pennsylvania Avenue NW
Washington, D.C. 20500

Dear Mr. President:

Recently you received a letter from 41 members of the U.S. House of Representatives urging you to instruct the Secretary of the U.S. Department of Health and Human Services to transfer nine medical research animals, commonly known as the Silver Spring monkeys, from the Delta Regional Primate Center to a private facility, Moorpark College in California or Primarily Primates in Texas.

The American Physiological Society is urging you to reject this request for both scientific and human reasons.

Eight of the monkeys are suffering and three are in critical condition. Four blue ribbon panels composed of veterinarians, physicians, and scientists trained in primate care have examined the monkeys and each time recommended euthanasia of the critically ill animals as the humane thing to do. Animal activists, however, have prevented by a court injunction the euthanizing of the monkeys. The issue continues to await a final decision by a federal district appeals court in Louisiana.

Moreover, federal guidelines and regulations require the euthanizing of chronically suffering animals.

These monkeys, if euthanized and tissues taken immediately, can contribute in an unique way to research on how the brain reorganizes itself after neurological damage. This particular research has direct application to stroke, brain injury, and peripheral nerve damage. An opportunity it examine tissues nearly 10 years after deafferentation is unlikely to ever happen again.

Animal activists have been trying to gain custody of the Silver Spring monkeys since 1981 when they were taken from a Maryland research laboratory. The activists were rebuffed by the Federal Court in Baltimore, the District Court of Appeals in Virginia, and the U.S. Supreme Court in attempts to gain standing so they could sue for custody. They also have sought custody of the monkeys through legislative initiatives in the current and last two Congresses. No action, however, has even been taken on these bills.

While the monkeys are under the guardianship of the National Institutes of Health, they remain the legal property of the Institute for Behavioral Research in Washington, D.C. Thus, neither the Congress nor the federal government would have the legal right to confiscate these animals which are private property.

A Maryland state court placed the monkeys in the care of the National Institutes of Health, which moved the animals to the federally-sponsored Delta Regional Primate Center in Louisiana. Their legal owners and a number of scientific societies, including the American Physiological Society, have been contributing financial support for the care of the monkeys, thus no taxpayer dollars are being used for their maintenance.

There is nothing to suggest that the Silver Spring monkeys would be better off by being moved from the regional center. If the 41 members of Congress and their animal activist supporters truly have the monkeys' welfare in mind, they would endorse the judgments of the primate experts rather than seek actions that only will prolong the agony of chronically ill animals.

As a Texas educator-research scientist and on the behalf of the 6,700 members of the American Physiological Society, the nation's senior scientific society, I urge you to heed the wisdom of the experts who have said the best care for the monkeys is to keep them at the regional primate center. Should your office need additional information, the Society would be pleased to be of assistance.

Thank you for your consideration in this matter.

Sincerely,

Vernon S. Bishop, Ph.D.
President

Federal, State Legislators Propose Felony Laws for Animal Facility Break-in, Theft

The Animal Liberation Front has begun to wear out its welcome in the halls of both the Congress and state legislatures.

The covert animal activist organization, which claims responsibility for doing millions of dollars in damage from vandalism and thefts at several dozen animal facilities since 1979, is now the target of two US senators and a handful of state legislators.

Senators Howell Heflin (D-AL) and Jesse Helms (R-NC) have introduced bills that would provide federal protection to animal research facilities and to animal facilities engaging in food production or agriculture research, respectively.

Both bills would make it a federal offense to release, steal, or to intentionally cause the loss of a laboratory or farm animal; to damage, vandalize, or steal any property from a farm or animal research facility; or to obtain access to a farm or animal research facility under false pretense.

Heflin's bill also contains provisions making it illegal to obtain, exercise control, possess, or use records, data, material, equipment, or animals taken by theft or deception from a research facility. Additionally, the bill provides that any person convicted of such violations is liable for making restitution not only for the replacement of stolen or damaged materials, data, equipment, or animals, but also to pay the cost for repeating any experiment that has been interrupted or invalidated.

The maximum penalties for conviction is a fine of $5,000 and one year in jail, or both, for each violation. The maximum penalties for the Helms' bill is a fine of $10,000 and three years imprisonment for stealing or releasing farm animals or damaging a farm animal facility; a fine of $1,000 and one year imprisonment for trespassing on a farm animal facility with the intent to commit a prohibited act.

Both bills have been referred to the Senate's Committee on Agriculture, Nutrition, and Forestry.

In recent months, five states have enacted laws protecting research facilities from vandalism and theft and two states have such legislation under consideration.

Massachusetts was the first state to enact legislation to protect animal research facilities from unlawful entry, vandalism, theft, and release of animals. The law provides maximum penalties of 10 years in prison and a fine of $25,000 for conviction of damage, trespass, or removal of property from any place where animals are housed or used in research.

Minnesota enacted a law stating that a person who intentionally and without permission releases an animal lawfully confined for science, research, commerce, or education will be guilty of a misdemeanor or liable for damages and costs of restoring the animal. For a second offense, the individual will be guilty of a gross misdeameanor, and a third and subsequent offense are felonies.

In Utah, a person will be guilty of a second degree offense if that individual enters or remains unlawfully in a research facility with the intent to obtain unauthorized control over, alter, eradicate, damage, deface, or destroy any specimen or property in the facility; release from confinement or remove any animal; or commit an assault on a person.

In Indiana, any person who recklessly, knowingly, or intentionally damages property that causes substantial interruption or impairment of work conducted in a scientific research facility will be guilty of a class D felony.

Louisiana enacted legislation stating that any person who enters or remains unlawfully in an animal research facility to commit or with intention to commit illegal acts as specified, including releasing or stealing any animal or damaging, vandalizing, or stealing any property, will be fined not more

How to Meet the Press

How do you respond to reporters' questions concerning your research and the care and treatment of your laboratory animals? Your answers will reflect directly on you and your institute and, perhaps, your future.

To help you meet the media, The American Physiological Society is sponsoring a one-day training program to be conducted by Oglivy & Mather, a New York City public relations firm. The program features individual hands-on experiences in self-defense techniques for dealing with a hostile interviewer, how to be heard and understood on a panel show, body language for the television camera, and methods to accentuate the positive aspects of your work and the need to use laboratory animals.

The training program will be conducted at the Grand Hyatt Hotel in Washington, D.C., on Sunday, April 1, 1989, beginning at 9:30 AM and ending at 4:30 PM. Registration fee for APS members is $25; for others attending the FASEB meeting the fee is $50.

than $5,000 or imprisoned for not more than one year, or both.

Two states – Connecticut and Wisconsin – have had similar bills introduced this year in their general assemblies.

The proposed Connecticut legislation states that any person who enters any premises used in research by a research institution and, without authority, willfully and maliciously injures, damages, removes, or interferes with any data, equipment, or property can be fined up to $10,000, imprisoned up to five years, or both.

Wisconsin's proposed bill states that whoever intentionally releases an animal lawfully confined for scientific, research, commercial, or educational purposes, acting without the consent of the owner or custodian of the animal, is guilty of a class C misdeameanor.

William M. Samuels

Politicization of NIH Noted by Wyngaarden

James Wyngaarden, who directed the National Institutes of Health from 1982 until he was asked to step down this year by the Bush Administration, noted in a session with health reporters how NIH has become politicized.

The tradition until the Nixon Administration, when two directors were fired, had been to keep NIH nonpolitical, based on the concept that research should not be determined by partisan goals.

Wyngaarden cited ways in which bioscience has become politicized:

- Those who oppose research using animals have "severely curtailed several kinds of research."
- Federal financing of research using fetal tissue from legal abortions continues to be forbidden. Moreover, an advisory panel recommendation that some fetal research to help some brain disease victims be permitted "is still being studied in the Department (of Health and Human Services) someplace" and if the past is any guide, it may never emerge.
- Regulations for emerging biological technologies, such as gene therapy, are severely limiting.
- NIH can neither finance nor do research in in vitro fertilization.
- Congressional probing into alleged scientific misconduct and fraud forces NIH into the political arena.

Significant Changes in Regulations Concerning Scientific Misconduct

The regulations for "Dealing With and Reporting Possible Misconduct in Science" have several significant changes from what Public Health Service proposed in 1988. The regulations became effective in November.

The changes, many of which parallel the recommendations stated in the American Physiological Society's letter of comment on the proposed rules, include a modification of the definition of misconduct. The modified definition limits misconduct to "fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research."

Dropped from the definition were "deception" and "material failure to comply with federal requirements that uniquely relate to the conduct of research." The definition also clarified that misconduct "does not include honest error or honest differences in interpretation or judgments of data."

The time schedule for institutions investigating alleged misconduct is unchanged from the proposed rules: 60 days to determine whether the allegations are valid or to document any delays, 30 days to begin formal investigation should the allegations have merit, and 120 days to complete the investigation.

The regulations also require that the institutions assure the Public Health Service that policies and procedures are in place for dealing with allegations of misconduct. An assurance form will be required annually as will information on allegations, inquiries, and investigations.

Some procedural changes also were made to incorporate the two newly established offices charged to deal with misconduct: the Office of Scientific Integrity at the National Institutes of Health and the Office of Scientific Integrity Review in the Office of the Assistant Secretary for Health in the US Department of Health and Human Services.

Institutions must notify the Office of Scientific Integrity when beginning a formal investigation and report its findings to that office. Institutions also must submit to that office a written request for extension when an investigation may exceed 120 days.

The Office of Scientific Integrity Review will review all final reports of investigations and make recommendations to the secretary regarding possible penalties.

CALL FOR PAPERS

Have you received your *Call for Papers?* Deadline for receipt of abstracts is *December 4, 1989.* **Contact** FASEB Meeting Office, 9650 Rockville Pike, Bethesda, Maryland 20814. Phone: (301) 530-7010.

U.S. Adopts Hard Line As Three PETA Demonstrators Face Federal Felony Charges

The federal government has taken a hard-line approach against animal activists who destroy property and assault employees during protest demonstrations.

A federal grand jury in Baltimore, MD, indicted three activists on felony counts for their actions at the National Institutes of Health (NIH) during a protest demonstration sponsored by PETA (People for the Ethical Treatment of Animals).

Charged with assaulting an NIH police officer were Alex Pacheco, 30, and Carol Burnett, 37, both of Kensington, MD, and charged with destroying government property was Edward M. Ashton, 40, of Beacon, NY, who broke open the front door of the NIH Administration Building, according to the indictments.

Several hundred people converged on NIH on April 24 to protest the use of laboratory animals in research and gained entry to the administration building by breaking the door. Police arrested 21 people for trespass.

Normally, demonstrators are charged with trespass or some other misdemeanor. "But these people (animal activists) have become more and more violent and it is time to draw the line," Maryland US Attorney Breckinridge L. Willcox said.

PETA's national director, Ingrid Newkirk, said the government's hard line will backfire because it will generate more activism by animal activists.

Both Pacheco and Burnett, if convicted of assault, face up to three years in prison and fines of $25,000. Ashton could get up to 10 years in prison and a fine of $250,000 if convicted of property destruction.

Industrial Organizations Ready To Challenge Animal Activists

Two sectors within the industrial community are preparing to take on animal activists seeking to outlaw the use of animals for testing consumer products.

Both the Procter & Gamble Company and the Cosmetic, Toiletry, and Fragrance Association are developing within their industries programs targeted at legislators, the media, and the public in states where activists are pushing to halt animal testing.

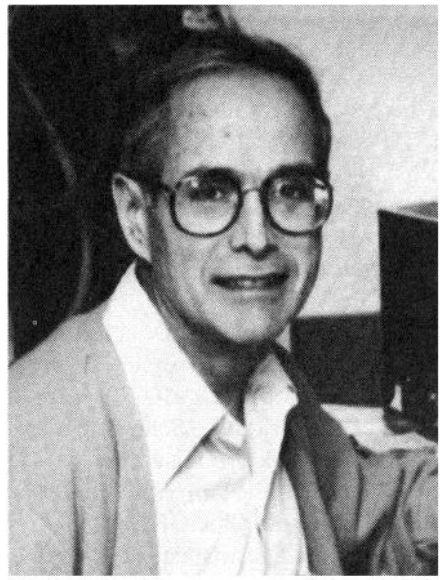
Procter & Gamble is seeking to raise $17.5 million over a three-year period to promote a pro-testing viewpoint. The money would be spent through the Industry Coalition on Animal Testing. Among the firms invited to join the coalition are Johnson & Johnson, 3M, Colgate-Palmolive, Bristol-Myers, Merck & Co., Syntex, Eastman Kodak, IBM, Monsanto, Lever Brothers, and Gillette. Each company would contribute $850,000 to support the coalition effort.

The cosmetic industry is seeking to raise $1 million from its members to finance its fight against those who want to ban animal testing.

E. Edward Kavanaugh, the association's president, said in a letter to the membership, "We are not dealing with rational opponents. We are dealing with zealots who cannot comprehend that a child's life is more important than a dog's." He added that the activists have distorted the industry's animal-testing methods, spread misinformation, and that the threat of adverse legislation is very real.

Both Procter & Gamble and the association said that the complete elimination of animal testing would jeopardize the safety of consumers.

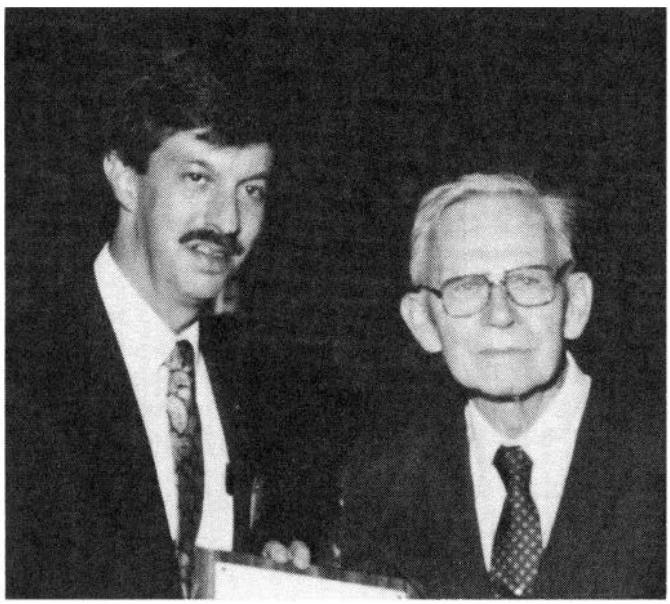
Donald Massaro Appointed to the National Heart, Lung, and Blood Advisory Council



Donald J. Massaro

Donald J. Massaro, MD, professor of medicine and physiology, Pulmonary Division, University of Miami School of Medicine, has been appointed to the National Heart, Lung, and Blood Advisory Council of the US Department of Health and Human Services' National Heart, Lung, and Blood Institute (NHLBI). As a council member, Massaro will take part in the evaluation of the institute's cardiovascular, blood, and lung diseases programs and will make recommendations to the institute director and NIH director concerning directions, goals, and priorities of these programs.

A member since 1971, Massaro is editor of the *American Journal of Physiology: Lung Cellular and Molecular Physiology.* Effective July 1, 1990, Massaro will be moving to Georgetown University where he has received the Naomi and Nehemiah Cohen Professorship of Pulmonary Research.



Martin Frank (l) and Emil Bozler on his 88th birthday.

Bozler Honored

Almost 200 scientists gathered in Columbus, OH, May 19–20 to honor **Emil Bozler** on the occasion of his 88th birthday and in recognition of his poineering studies of the mechanisms of smooth, cardiac, and skeletal muscle contraction. The "Frontiers in Smooth Muscle Research: Emil Bozler International Symposium" was organized by **S. Ebashi, H. Kuriyama, J. A. Rall, N. Sperelakis,** and **J. D. Wood** and featured internationally recognized smooth muscle researchers. In addition to the accolades provided by the scientific community, Ohio State University recognized his 53 years of service to the school by dedicating the physiology wing of a basic science building in his honor. Many of Bozler's classic papers were published in the *American Journal of Physiology,* including his description of the syncytial nature (1938) and basis of automaticity (1942) in visceral smooth muscle and basis of automaticity in mammalian cardiac muscle (1943).

Two other octagenarian smooth muscle physiologists were also honored during the conference. **C. Ladd Prosser** and **Edith M. Bulbring** were presented with plaques recognizing their contributions to smooth muscle research.

Glaxo Picks Charles Sanders to Head Operations in the Americas

Charles A. Sanders, MD, will become chief executive officer of Glaxo Inc., a US subsidiary of Glaxo Holdings p.l.c., and chairman of the Glaxo Holdings Latin American and Canadian subsidiaries. Sanders was vice chairman and a member of the board of directors of Squibb Corp., where he made immeasurable contributions to its research and development programs. Before joining Squibb, Sanders was general director of Massachusetts General Hospital, Boston, and professor of medicine at Harvard Medical School. The author of more than 100 scientific papers and health-care articles, he was elected to the Institute of Medicine of the National Academy of Sciences in 1976. Elected to membership in 1978, Sanders has served on various APS committees.

John H. Linehan, PhD, has become chairman of the Department of Biomedical Engineering at Marquette University, Milwaukee, WI.

APS member **Irving H. Zucker,** PhD, professor of physiology, has been appointed chairman of the Department of Physiology and Biophysics in the University of Nebraska College of Medicine.

X. J. Musacchia, PhD, is returning full time to his professorship in physiology and biophysics after 11 years as dean of the Graduate School, University of Kentucky, Louisville.

Formerly at the University of Texas, Dallas, **Kenneth Chien,** MD, PhD, has moved to the Department of Medicine, University of California, San Diego.

Richard Bland, MD, has accepted a position in the Department of Pediatrics, University of Utah Medical Center, Salt Lake City.

Wilfried Mommaerts

Since his retirement as chairman of the Department of Physiology at the University of California, Los Angeles, **Wilfried Mommaerts** continues his work on the regulation of myosin genes at the Max-Planck Institute in Heidelberg. Mommaerts also serves as chairman of the Exploration, Planning, and Advisory Committee (EPAC) of the European Union of Federations of Experimental Biology, a counterpart of FASEB.

Recent elections to the Institute of Medicine included APS members **Richard J. Havel,** professor of medicine and director of the Cardiovascular Research Institute, University of California School of Medicine, San Francisco, and **Robert M. Epstein,** professor and chairman of the Department of Anesthesiology, University of Virginia Medical Center, Charlottesville.

Pedro Jose, MD, PhD, was named president-elect of the American Society of Pediatric Nephrologists. Jose is vice chairman of pediatrics, director of pediatric nephrology, and professor of pediatrics, physiology, and biophysics at Georgetown University Medical Center. He was awarded the 1989 Dean's Prize for Biomedical Research from that institution. He received his PhD in physiology from Georgetown University in 1976, and became an APS member in 1979.

Paul M. Vanhoutte, MD, has been appointed director of the Center for Experimental Therapeutics at Baylor College of Medicine, Houston, TX. Formerly at the Mayo Medical School, Vanhoutte has been a member of APS since 1977.

APS member **Charis Roussos,** MD, MS, PhD, FRCP(C), formerly professor of medicine, McGill University, has moved to Attiki, Greece.

POSITIONS AVAILABLE

Postdoctoral Electrophysiologist. Applications are invited for a two-and-one-half year appointment to study ion channels in the epithelia of the lens and ciliary body of the eye. This work is supported by the Medical Research Council and is directed at furthering our understanding of the mechanisms underlying the transporting properties of these tissues. In particular, it is hoped that these studies will identify the primary events leading to cataracts and will help to develop rational therapeutic strategies for the control of intraocular pressure in glaucoma.

Applicants should have completed (or expect to complete in the near future) a PhD thesis. The work will involve the use of whole cell and patch clamp recording and applicants should have experience with electrophysiological techniques.

The starting salary will range from £8,675 to £11,680 per annum (RA1A scale).

Applications, which should include a curriculum vitae together with the names and addresses of two references, should be sent to Dr. T. J. C. Jacob, Physiology, PO Box 902, Univ. of Wales, Cardiff CF1 1SS, UK.

Postdoctoral Position available immediately to study the cellular properties/neuropharmacology of mammalian brain stem neurons involved in the control of breathing. A strong background in neurobiology (either vertebrate or invertebrate) is required. Training opportunities include the use of brain stem slices, current- and voltage-clamp techniques, patch clamp of dissociated neurons, and dye injection to study cellular morphology. The laboratory is well equipped and funded, with strong interactions between members of a university-wide interdisciplinary respiratory control group. Competitive stipend. Send curriculum vitae along with the names, address, and phone numbers of three references to Dr. Michael S. Dekin, School of Biological Sciences, University of Kentucky, Lexington, KY 40506-02251. [AAEOE]

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.

Modern Cardiovascular Physiology (2nd ed.)

Carl R. Honig
Boston, MA: Little, Brown, 1988, 317 pp.

Modern Cardiovascular Physiology is intended for medical and graduate students. It contains a special section before the text starts called "Overview, Concepts, and Themes." I found this section very interesting. Students should find it interesting, too. The textbook has two recurring themes: the safety factor and the systems concept of control. The text coverage is traditional: the heart, the biophysics of flow, capillary exchange, regional flows, and local control of flow, and nervous system control of flow and pressure. The control of the circulation via the endocrine system is rather light, particularly in regard to blood volume regulation. Tissue O_2 exchange has more detail than other books.

The book has interesting clinical correlations and encourages the readers to use the information presented to solve problems. In one of the appendices sample problems are presented and discussed.

This is a personal book. The interests of the author show. This book, in ways that I find difficult to explain, seems to be less didactic and more thoughtful than other books in the field. I am probably overstating the facts, but many first-year medical students, perhaps due to press of time and the volume of information they get, do not wish to spend much time thinking about difficult concepts. This book will not be their ideal as a compilation of what they need to memorize to give back in a test. Medical students later in their educational process should like the book, and graduate students and faculty should appreciate the thought content.

Wendell N. Stainsby
Department of Physiology
University of Florida

Methods in Bronchial Mucology

Pier Carlo Braga and Luigi Allegra (editors)
New York: Raven, 1988, 423 pp., illus., index, $89.00

Mucus is a complex substance derived from several sources. Ion transport in the surface epithelium regulates the water content. Mucus glycoproteins are secreted by several cell types, including goblet and Clara cells of the surface epithelium and mucous and serous cells in the submucosal glands. Cells without secretory granules (e.g., ciliated cells) also secrete a pronounced glycocalyx that contributes to the overall composition. Several other substances such as antibacterial proteases are secreted. Further adding to the complexity of mucus is the fact that it exists in two phases. An aqueous "periciliary sol" layer bathes the cilia, and, at least in diseased states, a viscous gel, the mucous blanket, floats on top of the sol. *Methods in Bronchial Mucology* described methods for determining the properties and amounts of these different components.

Mucus behaves as both a liquid (with viscosity) and a solid possessing elasticity. This "nonideal" nature, together with time- and stress-dependent changes, complicates measurements of the rheological properties of mucus. Several techniques for determining its elasticity and viscosity are described, including an oscillating pestle-and-mortar device, magnetically oscillating steel balls, flow-down capillary tubes under a pressure gradient, and nuclear magnetic resonance. Correction factors for wall effects and other potential artifacts are intimidating, and the values for elasticity and viscosity obtained are highly dependent on the magnitude and rate of application of the forces applied, as well as on the mathematical model of mucous properties that is chosen. Other articles describe more empirically measured rheological properties of mucus including adhesivity, spinability, pourability, thixotrophy, and tackiness.

Methods are described for measuring the amounts of the individual components of mucus. These include glycoproteins, immunoglobulins, DNA, ions, surfactant, lactoferrin, lysozyme, and antibacterial proteases. Compared with the rheological measurements, these methods are relatively straightforward. Other articles consider the different sources of mucus. Methods for measuring total secretions from individual glands and monitoring serous cell secretion are described, together with a variety of somewhat crude methods for determining total mucous output. Culture of specific cell types would greatly aid in determining the contributions of given cell types to the overall secretion. Unfortunately, the rather primitive culture techniques described in this book produce dedifferentiated cells of nondescript phenotype. Recently, however, Van Scott and co-workers (*Proc. Natl. Acad. Sci. USA* 84: 5496–5500, 1987) have successfully produced pure cultures of Clara cells, demonstrating the feasibility of this approach.

Mucus is only one component of "mucociliary clearance." Ciliary motion is the other, and two methods are described to measure its frequency. In single or small groups of cells, ciliary beat frequency can be determined using high-speed cinematography. With intact epithelium, the angle of reflection of an incident beam varies with the orientation of the ciliary during a ciliary wave. A microscope situated above detects these changes in angle as a flickering that is assumed to represent ciliary activity with each cycle of light fluctuation corresponding to a beat cycle. Other methods, such as the use of a stroboscope or scattering of laser light, are not described in detail but the appropriate references are provided.

Finally, methods for measuring mucous transport rates in experimental animals and humans are described.

Most of the 33 chapters contain appendices with addresses of suppliers and detailed protocols for particular methods. Thus in many cases an investigator can set up a desired method from scratch using this book alone. Some chapters, however, are disappointingly brief, containing neither references nor appendices. The one-page chapter on mucous adhesiveness, for example, gives absolutely no indication as to how to obtain or make the necessary equipment. Surprisingly for a book with so many authors there is little overlap bewteen chapters. An exception is the presence of two chapters on sampling mucus from individual sources. The role of epithelium and its secretions in airway disease is becoming of increasing interest to pulmonary researchers. This is the first book to cover methods in the entire field and should prove useful to many workers.

Jonathan H. Widdicombe
Cardiovascular Research Institute
University of California, San Francisco

Molecular Biology in Physiology

Shu Chien (editor)

New York: Raven, 1988, 181 pp., illus., index, $56.00

This essay/review concerns at once an issue and a book. The issue: What will the relation between physiology and molecular biology be? Will the latter destroy the former? Will physiology come to terms with a very competing field and use it for the solution or reformulation of its own problems?

These questions are the pure extremes of what a sampling of opinions would reveal. It would seem that physiology, having come to grips with both electricity and chemistry in the past, would easily adopt the methods and the concepts of the current "Jeunesse Dorée."

Anatomists have been more alert and are converting their laboratories into cell-biological research groups. By contrast, physiologists have not succeeded in introducing symposium coverage of molecular biology to the international physiological congress (apart from one occasion, where a half-day symposium had more speakers than auditors).

The book in question is based on a workshop held at the 1987 APS meeting. Let us agree at once that this book represents a laudable effort. There are three questions: How successful is it? How can we do better? What needs to be said about the broader issue?

There are, actually, two separate aspects in this book, presented here in reverse order. The larger part of it is in the form of six contributed chapters, which differ in scope and style. The important question is what do these chapters give us. In order: *1*) "Molecular Genetics of the Mouse Anion Exchanger," *2*) "gt-11 Cloning: Isolation of the Gene for the Neurospora Plasma Membrane H^+-ATPase" (these first two titles could be improved for the intended audience), *3*) "Molecular Biology of the Genes for Atrial Natriuretic Factor and Renin," *4*) the "β-Adrenergic Receptor and Other Receptors Coupled to Guanine Nucleotide Regulatory Proteins," *5*) "Molecular Structure and Function of Acetylcholine Receptors and Sodium Channel," and *6*) "Initial Steps Toward a Molecular Biology of Long-Term Memory." The authorship is prestigious and includes names such as Lodish, Baxter, Numa, and Kandel.

For the most part, the chapters represent competent descriptions of the genes involved in the expression of functionally distinct protein structures, with some variety of remarks on regulatory or functional implications. Is this physiology? Yes, indeed. Let us recall the classical physiology (by Barcroft, Roughton, and others) of hemoglobin. To understand the process of O_2-transport, one has to study the dissociation curve from a physiological-chemical point of view; while doing so, one does not have to speak all the time of the tidal volume or the mechanisms of central respiratory control. Physiology exists at many levels.

One may distinguish certain connotations in which such molecular-physiological analyses are studied. One level is that of the physiological control of selective gene expression, often in a context of endocrinology. This group is the simplest because, while of great functional importance, the arguments move more or less on the same plane, where chemistry begets chemistry. The second level is that at which a vectorial directionality is introduced, in terms of membrane transport. On the third level, such transport processes become involved in conducted excitation, by ligand or by voltage-controlled allosteric mechanisms, which are so organized as to lead to sensory and neuromotor phenomena. What is not covered in the book is the fourth group, where allosteric transduction by molecular engines gives rise to the generation of vectorial force, thereby creating the motor phenomena by which we are different from vegetables. This absence is regrettable, not only because of the vast world of behavioral functions omitted, but especially, in the context, because the molecular biology of muscle is one of the most fascinating scenes of the moment. Perhaps the most versatile chapter is that by Kandel (6), which leans toward the molecular biology of learning and memory but has not quite reached that level yet. It will get there soon enough!

In one technical point, we should express a mild editorial criticism. In books like this, one expects those tabulated sequences, those mysterious lines like GCAGTTTACG, etc. Some of these are readable in the book. Some, however, are what in the study of vision and modern art are known as "disquieting pictures." If the sequences don't floor you, the resulting headache will.

So far, then, about three-quarters of the book is devoted to specific systems. These chapters are concise and dense, by specialists and read by specialists. The physiologist wishing to study these will need determination and help. How much help is actually provided by the first one-quarter of the book, where one is introduced and initiated into the second language? No enough, unfortunately. This is not for lack of effort, and a praiseworthy effort it is, doing as well as possible in the allotted space. It is that space allotment that is at fault. One cannot explain, to an intelligent layman such as a physiologist, both the theory and conceptual spread of molecular genetics, and the variety of ingenious techniques, in 34 pages. The physiologist hoping to acquire a reading knowledge of the essentials finds himself in a quandary.

Would there not be one single book with which to supplement *Molecular Biology in Physiology* where it falls short, i.e., in respect to the general foundation? Fortunately, there is. It is titled *Recombinant DNA, a Short Course,* by J. D. Watson, J. Tooze, and D. T. Kurty (1983, Scientific American Books), and it comes as close to the goal as possible in about 250 pages. It is well written, with a mixed conceptual-historical approach, and is as clear as can be. Yes, it contains that sentence ". . . and biology, the science of living objects, which only 30 years ago was generally perceived to be a much inferior science . . . ", but that is a small irritant to accept for what it gives: one of the best examples of didactic and explanatory talent. As an example: one can designate a partial DNA sequence as a "promoter" without contributing either meaning or evidence. Here it is shown how the notion of a promoter arose in the study of the lactose operon by Monod, Jacob, and Lwoff. Likewise, it is shown how the work of Griffith followed by that of Avery, McCarty, and MacLeod cast DNA into the role of the carrier of heredity. The historical-logical path is the only path, because that is how knowledge is discovered. A previous book by Watson, *The Molecular Biology of the Gene,* went through three editions. There is a fourth edition (by Watson and others, Benjamin-Cummings, 1987), much larger and full of details, but still aiming at the same lucidity of presentation. Despite this expository skill, the book is still difficult reading, and the novice will be advised to study it while obtaining laboratory experience simultaneously.

So much about molecular biology, and a first step as to how to learn it. What about physiology? My first proposition is that we have to learn about the new directions, or we get swept off both the academic rosters and the budget sheets. But we should not become mere imitators saying "me, too."

A year and a half ago, I attended, for the last time in regular standing, the meeting of the Association of Chairmen of Departments of Physiology. One of the colleagues announced the name change of his department to "Department of Physiology and Cellular Biophysics" or something like that. Being in a light-hearted mood, I proposed the possibility of renaming ours the "Department of Human, Comparative, Evolutionary, Regulatory and Cell and Molecular Physiology, Neurobiology and Biophysics, . . . Physiology, for short." Because physiology should stand for all of that, and especially its synthesis.

Wilfried F. H. M. Mommaerts
Department of Physiology and Molecular Biology
Max Planck Institute

Missing the Meaning? A Cognitive Neuropsychological Study of Processing of Words by an Aphasic Patient. David Howard and Sue Franklin. Cambridge, MA: MIT Press, 1989, 171 pp., illus., index, $25.00.

Exercise and Sports Sciences Reviews. American College of Sports Medicine Series (vol. 17). Kent Pandolf. Baltimore, MD: Williams & Wilkins, 1989, 569 pp., illus., index, $46.95.

Meaning and Mental Representation. Robert Cummins. Cambridge, MA: MIT Press, 1989, 180 pp., illus., index, $20,00.

Airway Smooth Muscle in Health and Disease. Ronald F. Coburn (editor). New York: Plenum, 1989, 318 pp., illus., index, $59.50.

Bristol-Myers Nutrition Symposia. J. L. Moore (series editor). *Vol. 7: Nutrition and the Origins of Disease.* Charles H. Halsted and Robert B. Rucker (editors). San Diego, CA: Academic, 1989, 386 pp., illus., index, $49.95.

Anatomy: To Color and Study. Ray Poritsky. Philadelphia, PA: Hanley & Belfus, 1989, 264 pp., illus.

Perspectives in Exercise Science and Sports Medicine (vol. 2). *Youth, Exercise, and Sport.* Carl V. Gisolfi and David R. Lamb (editors). Indianapolis, IN: Benchmark, 1989, 590 pp., illus., index, $40.00.

Cognitive Science in Medicine: Biomedical Modeling. David A. Evans and Vimla L. Patel (editors). Cambridge, MA: MIT Press, 1989, 421 pp., illus., index, $35.00.

Reviews on Immunoassay Technology (vol. 1). S. B. Pal (editor). New York: Routledge, Chapman & Hall, 1988, 234 pp., illus., index, $89.95.

Reviews on Immunoassay Technology (vol. 2). S. B. Pal (editor). New York: Routledge, Chapman & Hall, 1988, 204 pp., illus., index, $89.95.

Neural Computing Architectures: The Design of Brain-Like Machines. Igor Aleksander (editor). Cambridge, MA: MIT Press, 1989, 401 pp., illus., index, $45.00.

ANNOUNCEMENTS

NIH News

International Grants and Fellowships in the Health Sciences Directory

The latest publication, *Directory of International Grants and Fellowships in the Health Sciences,* of the National Institutes of Health is available and may be obtained by sending a self-addressed label to Public Affairs Office, Fogarty International Center, Building 16, Room 306, National Institutes of Health, Bethesda, MD 20892.

Nutrition and Cancer Call for Grant Applications

The American Cancer Society is accepting applications from Cancer Centers and other academic institutions for its Special Institutional Grants on Nutrition and Cancer (SIG) Program. The purpose of the program is to stimulate interdisciplinary research on the role of nutrition in cancer. Emphasis is placed on laboratory and epidemiological studies that will identify dietary patterns and factors that may cause or prevent cancer.

The program is limited to a maximum of two new grant awards per year, and only one Special Institutional Grant will be awarded per institution. Recipient institutions will be funded for periods of up to five years; the maximum award is $200,000 per year, including 25% indirect costs. The institution may apply for one competitive renewal for an additional five-year period.

The next deadline for receipt of applications is March 15, 1990, for grants to be funded beginning January 1, 1991. Additional information can be obtained from the Research Department, American Cancer Society, Inc., 1599 Clifton Road NE, Atlanta, GA 30329. Potential applicants should contact Dr. John Laszlo, Senior Vice President for Research, at (404) 329-7535, or Dr. Dawn Willis, Scientific Program Director for the SIG program, at (404) 329-7554, for guidance before preparing grant applications.

Future Meetings

1990	
FASEB Annual Meeting	April 1-5, Washington, DC
APS Fall Meeting	October 7-11, Orlando, FL
1991	
FASEB Annual Meeting	April 21-26, Atlanta, GA
APS Fall Meeting	September 29-October 3, San Antonio, TX
1992	
FASEB Annual Meeting	April 5-9, Anaheim, CA
1993	
FASEB Annual Meeting	March 28-April 1, New Orleans, LA

IUPS News

IUPS Regional Meeting Prague, Czechoslovakia

The Regional Meeting of IUPS in Prague, June 30-July 5, 1991, will bring together physiologists from all European and Mediterranean countries. One of the important goals is to improve contact between physiologists working in different parts of Europe and in the neighboring countries and to promote international collaboration in research. The scientific program will highlight recent advances in all major areas of animal and human physiology achieved on the systemic, organ, cellular, and molecular levels; special attention will be devoted to teaching physiology. *For registration information, contact:* Secretariat of the Organizing Committee, Regional Meeting of IUPS, Prague 1991, P.O. Box 88, Vitezneho unora 31, 120 26 Prague, Czechoslovakia.

XXXII IUPS Congress Glasgow, Scotland

The British National Committee for Physiology invites physiologists to the XXXII International Congress of Physiological Sciences to be held in the United Kingdom, July 25-30, 1993.

This congress will follow, to some extent, the conventional format and will in addition continue the rejuvenation of the spirit of congresses by addressing the question of fractionation of scientific endeavour by including a part of most, if not all, satellite symposia within a central meeting. The main congress will include some special review lectures to highlight the development of ideas and new achievements in various areas of physiology, as well as symposia to encourage the free dissemination of ideas, techniques, and progress in all areas of physiology. Oral and poster communications will be accepted to either complement

APS Sustaining Associate Members

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

American Medical Asssociation
Beckman Instruments, Inc.
Berlex Laboratories
*Boehringer Ingelheim
Burroughs Wellcome Company
Ciba-Geigy Corporation
Coulbourn Instruments, Inc.
Dagan Corporation
E. I. du Pont de Nemours & Company
Glaxo, Inc.
Gould, Inc.
Grass Foundation
Harvard Apparatus
Hoechst-Roussel Pharmaceuticals, Inc.
*Hoffman-La Roche, Inc.
ICI Pharmaceuticals Group
Jandel Scientific
Janssen Pharmaceutica
R. W. Johnson Pharmaceutical Research Institute
Lederle Laboratories
Lilly Research Laboratories
McNeil Pharmaceutical
*Merck & Co., Inc.
Miles Institute for Preclinical Pharmacology
NARCO Bio-Systems
Norwich Eaton Pharmaceuticals, Inc.
Pennwalt Pharmaceuticals
Pfizer, Inc.
Pharmacia, Inc.
Pillsbury Corporation
Procter & Gamble Company
Quaker Oats Company
*Sandoz, Inc.
*Schering-Plough Corporation
G. D. Searle and Company
Smith Kline & French Laboratories
*Squibb Corporation
Sterling Drug, Inc.
Sutter Instruments Company
*The Upjohn Company
*Warner-Lambert/Parke Davis
Waverly Press
Wyeth-Ayerst Laboratories

*Second Century Corporate Founders

symposia or as free communications. A vital part of the congress will be the organization of workshops to help teachers in third world countries provide a more effective education for their students.

A number of satellite symposia are expected to take place in the British Isles and discussions will take place to try to bring the basic review and controversial components of these satellites into the framework of the congress as a whole.

Preliminary registration information may be obtained from: Congress Secretary, IUPS 1993, Department of Biomedical Science, The University, Sheffield S10 2TN, UK.

Members are invited to submit nominations for honorary membership. Send nominations and documentation of the candidate's contributions to physiology to the APS Honorary Membership Committee, 9650 Rockville Pike, Bethesda, MD 20814, by December 1, 1989.

Third World Academy of Sciences

Dear Dr. Frank,

Thank you for your letter of 28 March 1989 and all your efforts in helping us along with our Donation Programme.

I am happy to inform you that both ICTP and TWAS will be extremely happy to receive scientific equipment, which should be in good working condition, to be distributed among laboratories in developing countries. We would appreciate it to receive first a list of the equipment with detailed information so that we can then decide where all the equipment can be sent.

In case the Institutes are unable to cover the shipping costs, we will be happy to reimburse the expenses upon receipt of an original shipping invoice.

Thank you once again for your kind collaboration to the Donation Programme.

With my best regards.

Yours sincerely,

H. R. Dalafi
TWAS
International Centre for Theoretical Physics
P.O. Box 586
34100 Trieste, Italy

Scientific Meetings and Congresses

Endothelial Cells in Development and Disease. Hyatt Regency, Crystal City, Virginia, November 19–21, 1989. *Information:* Pamela Williams or Fern Finger, Department of Cell Biology, New York University School of Medicine, New York, NY 10016. Phone: (212) 340-8772 or (212) 340-5327.

Second International Conference on Sound and Vibration in Pregnancy. Gainesville, Florida, February 15–16, 1990. *Information:* Robert M. Abrams, PhD, Department of Obstetrics and Gynecology, Box J-294, JHMHC, University of Florida Health Science Center, Gainesville, FL 32610. Phone: (904) 392-3179.

Fifth International Interdisciplinary Conference on Hypertension in Blacks. Ramada Renaissance Hotel, Long Beach, California, May 3–7, 1990. Abstract deadline is November 1, 1989. *Information:* ISHIB, 69 Butler Street, S.E., Atlanta, GA 30303. Phone: (404) 589-3810; FAX: (404) 688-5169.

Thirst: Physiological and Psychological Aspects. Washington, DC, May 9–11, 1990, sponsored by the International Life Sciences Institute (ILSI). *Information:* Lili Merritt, Conference Coordinator, ILSI, 1126 16th Street, N.W., Washington, DC 20036. Phone: (202) 659-0074; FAX: (202) 659-3859.