CONTENTS

PHILIP BARD

1898 -

Philip Bard was born in Hueneme, California in 1898, the son of Thomas Robert Bard and Mary Beatrice (Gerberding) Bard. His father was a distinguished citizen of California who contributed greatly to the political and economic development of his state; he served it as Senator from 1901 to 1905. Philip was the youngest of seven children; his oldest sister was 20 years his senior. Each sibling appears to have taken a particular and affectionate interest in the development of the youngest brother, in a period of his life Dr. Bard has himself described with grace and charm in a recent essay. He was educated first "in a very good school" in Pasadena, then at 14 enrolled in the preparatory school founded and led by Sherman Day Thatcher, in the Ojai Valley of Ventura County, California. Dr. Bard has denied having displayed any sign of academic excellence during his years at school, and failed four of the six entrance examinations for Princeton, in 1917 (he was to graduate with highest honors from that University in its class of 1923). It is clear nevertheless that his school experience had a lasting influence upon his future life. Academic excellence or not, it is worthy of note that by the age of 16 he had developed an enduring interest in Biomedical Science, had obtained and read the 1905 edition of Howell's Textbook of Physiology, and had made his first attempt at physiological experimentation! Dr.

Bard regards Sherman Thatcher, his next older brother Richard Bard, and Walter Cannon as the three individuals who influenced him most profoundly.

War intervened with plans for further education. In June of 1917 the young Bard volunteered to the Stanford unit of the U. S. Army Ambulance Corps. He served through six campaigns on the Western Front, his copy of Howell along in his duffle. In 1919, upon his return to California, Bard sought advice from the great San Francisco physician, Walter Alvarez. The latter encouraged his interest in Biomedical Science, told him of his own experiences in the Cannon laboratory, and guided the nascent Physiologist to Sir William Bayliss' Principles of General Physiology. Thus upon matriculation at Princeton in the fall of 1919, Bard had already studied two of the great classics on Physiology then extant in the English language, Howell and Bayliss.

At Princeton Bard went diligently about his academic tasks; his war experiences left little enthusiasm for many ordinary undergraduate activities. He quickly absolved his entrance conditions, and established himself as a superior scholar. He displayed here at Princeton a property - call it luck, coincidence, or natural selection - he has exhibited all his life: a tendency to associate with other individuals of superior talent. His teachers of Biology were two of the greatest scientists then active in the field, Edwin Grant Conklin and E. Newton Harvey. It was undoubtedly the latter who reinforced his student's appreciation of the beauty and joy of biological research, and influenced the decision to abandon Medicine, per se, as a career, and to engage in research in Physiology. Dr. Bard spent a fifth year at Princeton better to prepare himself for such a career, and in the fall of 1924 entered the Division of Medical Sciences at Harvard University, to work for the Ph. D. under the direction of Professor Walter Cannon.

One can appreciate the intellectual excitement of the Cannon laboratory of the 1920's, and imagine its effect upon an entering graduate student. The senior staff was composed of individuals with international reputations for scientific discovery: Professor Cannon himself, continually active day-by-day in the laboratory; Alexander Forbes, the founder of American Electrophysiology; Alfred Redfield; Cecil Drinker. Younger staff members were later to attain equal distinction, among them Hallowell Davis and William B. Castle. The central theme of Dr. Cannon's own investigations was the autonomic nervous system, particularly the sympathetic. Almost every aspect of the subject was under study: its anatomical origin and distribution, and peripheral effector actions; its neurohumoral mediators; the hollistic action of the sympathetic under conditions of stress; its central nervous regulation; the control systems regulating bodily states - the concept of homeostasis; the interrelation of endocrine and autonomic systems in those regulations; and the central nervous mechanisms in emotional expression. It was the last which attracted Dr. Bard's enduring interest, and became the subject of his thesis research and of many investigations which followed it. In the former he showed that the integration of sympathetic and somatic efferent discharge that characterizes the expression of rage in carnivores depends upon the integrity of the posterior hypothalamus; only fragments

of the fully integrated reaction appear with lower truncations of the brain stem. The excessive and readily evoked "quasi-emotional" behavior displayed by decorticated animals was conceived to be an example of the release of function, in the tradition of the ideas of Jackson and Head. Perhaps more importantly, this first study provided an experimental definition of a neural center, a concept that has guided the later work of many investigators. The integrating and regulating function of the hypothalamus was then pursued by Dr. Bard in a long series of investigations, with a number of collaborators, at Princeton (1928-1931), once again at Harvard (1931-1933) and from 1934 onward at Johns Hopkins. They include, in addition to the central neural mechanisms in the expression of rage and fear, studies of hypothalamic function in regulating sexual behavior and the reproductive cycle, in governing the pituitary gland and its target organs, in regulation of body temperature, and in the production of fever.

In March, 1933 (he was then 34 years old) Dr. Bard received an invitation from the President of the Johns Hopkins University to join its faculty as Professor of Physiology, and Director of that Department in its School of Medicine. He had previously no inkling of this event, no invitations to visit, no grueling examinations by search committee members. He had published only a handful of papers, and considered himself still a beginner. The appointment was wholly in the tradition of the institution he joined: quietly to seek out the most promising young man in a field, give him free rein to develop it, and take whatever chances attend such audacious behavior. Perhaps seldom in its history has such a typical Hopkins appointment met with such universal approval, and long-term success. Thus Bard succeeded to the chair held originally by the man whose writings had first aroused his desire to do physiological research, nearly 20 years earlier, William H. Howell. Bard himself was to hold that chair for a period of 31 years.

Dr. Bard has related that upon his arrival in Baltimore he found himself in a peculiar and unexpected, and in some ways an embarrassing position. He was immediately accepted by his colleagues as a scholar of impeccable credentials and international reputation, a co-equal with the leaders of the institution: Allen Chesney, its dean; Lewis Weed, William Mansfield Clark, E. Kennerly Marshall, Adolph Meyer, Henry Sigerist, Edwards Park, Allan Woods, Dean Lewis, William G. MacCallum, Warfield Longcope, Walter Dandy, Frank Ford - and a covey of others scarcely less distinguished in their respective fields of Medicine and Biomedical Science. This was his exposure to what has been termed the Heritage of Excellence, but which may also be called the expectation of excellence. Dr. Bard found a Dean and an administration that considered its sole function to be to serve the needs of the faculty. He was given complete authority in all matters relating to Physiology - staff, research, teaching programs; along with it went total responsibility. Though his resources were by current standards pitiably small, he rejuvenated a small department, induced Chandler Brooks and Clinton Woolsey to join him in associations that lasted for many years, and initiated with them a continually productive program of research in the Physiology of the Nervous System.

Dr. Bard had taken up, before leaving Harvard, the general problem of the localization of function in the cerebral cortex. His particular interest was in the motor and the sensory cortices, his measure the integrity of the placing and hopping reactions. With Woolsey and Brooks, Bard carried out an extensive comparative study of the cortical control of these postural reactions, showed their increasing corticalization in phylogeny, their loss following discreet local lesions of the somatotopically related portions of the sensory and motor cortices, and by their integrity the remaining capacity for function of similarly located surviving remnants of cortex. These studies perhaps represent the limit to which the methods of surgical ablation and clinical examination can be pushed in the elucidation of cortical function; they culminated in Bard's Harvey lecture of 1938. Shortly before that time Wade Marshall had introduced the evoked potential method to the Hopkins laboratory. Dr. Bard participated in the earliest of these electrophysiological studies, a mapping of the somatic sensory area of the monkey. Thereafter he left them to flower in the hands of Woolsey and students and colleagues, and returned to his earlier interests in the central neural mechanisms governing emotional behavior, and the regulatory functions of the hypothalamus.

The educational paradigm Bard found at Hopkins differed somewhat from that he had known hitherto. Graduate, Ph.D. - oriented programs were virtually non-existent in the basic science departments of the School of Medicine (they have since grown elaborately). The first and dominating responsibility was then, as it has continued to be, the education and maturation of the students of Medicine; the second was the further polishing of young faculty members "in training" for posts elsewhere; the third was the training in research of postdoctoral fellows. Dr. Bard excelled in all these, particularly in the education of medical students. His influence upon them was direct and profound; he had scarcely a peer on the faculty in the teaching of basic medical science. He taught in a very personal way, gave a course with the minimal number of lectures, and emphasized individual initiative, free time for scholarly endeavor, and the small group laboratory exercise. The latter was not, in his hands, aimed at the repetition of experiments the results of which are already well known. He used it to bring teacher and taught into direct dialogue around a naturally occurring problem, to enhance the student's powers of observation and reasoning, to teach him to evaluate evidence critically. Of thirty-one classes of Hopkins students who passed through his department, scarcely a graduate exists but recalls him with respect and affection; and for many it was he who taught them something unforgettable, the truly artistic beauty to be found and revealed in the scientific enquiry into the Physiological basis of Medicine.

Dr. Bard served the American Physiological Society in many ways, not least as its President during the years of the second World War, 1942-1945, and thereafter for many years as a member of its Board of Publication Trustees. There his wise fiscal policies prepared the base for our currently flourishing publication enterprise.

His laboratory life was interrupted for four years in the mid-fifties, when he succumbed to the appeal of his colleagues that he serve as Dean

of the Medical Faculty, during a time of stress. He discharged this responsibility with sympathy and skill, but relinquished it as soon as practicable. In his department Dr. Bard created an atmosphere almost ideal for academic endeavor. He led each of his intimate associates to understand that he had the Professor's complete confidence. Each quickly realized that he was free to pursue his own interests and ideas, no matter where they led. Bard seemed able always to discover and turn to the light the best qualities of those about him, and to let them grow and develop to the full in their own, personal ways. With that total freedom he assigned that which he had himself received, total responsibility.

The esteem with which Philip Bard is regarded by his Hopkins colleagues is exemplified by the following phrases which were printed upon the program of an occasion in his honor:

"... retiring and modest in his person, absolute in devotion to scholarly endeavour, enjoying to the full the pleasures of the free academic life, he has over these years brought distinction to our faculty, inspiration to our students, leadership to our University, and a happy good fellowship to his colleagues."

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GROUP FLIGHTS TO APS FALL MEETING IN SAN FRANCISCO

Inserted with this issue of The Physiologist is a schedule of group flights and reservation forms for members of APS and their immediate families arranged by Chevy Chase Travel, Inc.

Please note that under the heading Rules are the CAB regulations for flights 1, 2, 3, and 4 which state that you must be a member of APS at least six months prior to departure date to be eligible for the group fares.

OPERATION OF NEW ELECTION PROCEDURE

In April 1974 at the Business Meeting of the Society the Bylaws were amended to provide for the election of President-Elect and members of Council by mail rather than in the Business Meeting. This amendment was proposed based on a survey of membership desires which showed a high proportion of members favoring the change. Cne of the principle arguments supporting the change was greater member participation in the elections.

As this issue goes to press the deadline (February 1) for the election is imminent. The total number of ballots received as of January 30 is 1677, or 44% of the members eligible to vote. By comparison, election of the President-Elect has customarily involved a total referendum of 250 or less. As election of council members usually occurred at the second Business Meeting the referendum for this election has frequently been 150 or less. Thus the purpose of amending the election procedures has been realized by a factor of 6 in the case of President-Elect and a factor of 10 in the case of Councillor.

Next week (February 4)the ballots will be counted by the Executive Secretary, in the presence of two members of the Society designated by Council, as prescribed in the operational plan supporting the amendment.

The new officers, taking office in July, 1975 will be announced at the Business Meeting of the Society held at 4:30 PM, April 15, 1975, in Room 21 of Convention Hall, Atlantic City, New Jersey, and will be published in the May issue of The Physiologist.

THE NATIONAL CORRESPONDENTS NETWORK

A call for volunteers to serve in the National Correspondents Network went out in the November, 1974 issue of The Physiologist. The membership was reminded how important this service is to us all and it was pointed out that the deficit in the ranks of the correspondents included 75-80 physiologists. It is immensely gratifying to report that more than twice that number of our members have made an offer to serve.

Naturally, we would like to use everyone who has responded and we will try to find a way to do so. However, as a practical matter, only the needed half will be designated as National Correspondents. Designations have been made to provide broad institutional and congressional district coverage, but with an eye also toward the easy availability of clerical and other office support for the correspondent. A list of the designated National Correspondents of the American Physiological Society is appended to this brief message.

We now urge those of you who have already offered to help to make yourself available to your nearest correspondent. He will already have the card you returned and will expect to hear from you. We also urge those of the membership who would have liked to help but could not see the way clear to undertake the full responsibility of being a correspondent to get in touch with the nearest correspondent. We believe most would welcome an opportunity to develop a teamwork approach to the operation of Network, at least in the larger centers.

Thank you all very much.

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PROPOSALS FOR CHANGES IN BYLAWS REGARDING MEMBERSHIP

Two proposals for changes in APS membership Bylaws were discussed in the last issue of this journal (The Physiologist, Vol. 17, No. 4, November 1974, pp. 411-413 & 415-416).

Response was solicited from the membership concerning whether they are "in favor" or "not in favor" of the two proposals:

1) The establishment of a category of "Corresponding Membership";

2) Expediting election procedures for new members.

This is a report of the result of responses to that solicitation.

The total number of response cards received was 1066 (as of Jan. 21, 1975).

Of these respondents 878 (83%) are in favor of establishing a "corresponding member" category as described. 181 (17%) were not in favor of this action.

Among the respondents, 901 (86%) favored expediting election procedures by the method described. 146 (14%) were opposed.

Comments were offered on sixty-three of the cards returned. Twenty-eight comments were supportive of the corresponding membership proposal; twenty-three in opposition to the proposal. Eight comments supported the proposal for expediting election procedures; nine opposed the change.

A number of comments were directed to other factors, such as specific suggestions for implementation of corresponding member recruitment, and expression of satisfaction at the method used of sensing membership reaction to the proposals.

Council will consider the response to the questionnaire, including individual comments, in reaching a decision concerning presenting these amendments to the Bylaws to the Business Meeting of the Society on April 15 or 17 in Atlantic City.

A two-thirds majority vote at a Business Meeting is required to amend the Bylaws.

TEACHING SESSION

Spring Meeting, Atlantic City
Previewing of Slide-Tapes - APS
9:00 A.M. - 12:00 Noon, Wednesday, April 16
Grand Ballroom, Convention Hall

Ten different self-instructional slide-tapes will be shown simultaneously every half-hour beginning at 9:00 A.M.

Titles of the tapes are:

The Kidney and Sodium Balance, Franklyn G. Knox, M.D., Ph.D.

Body Fluids I: Fluid Compartments and the Renal Countercurrent Multiplier, Howard S. Frazier, M.D.

Body Fluids II: Urinary Concentration and Dilution, Howard S. Frazier, M.D.

Body Fluids III: Urea Excretion, Antidiuretic Hormone and Thirst, Howard S. Frazier, M.D.

Adaptive Mechanisms of Thermoregulation in Man, Comparative Aspects, Jack W. Hudson, Ph.D.

Adaptive Strategy of Man in Thermoregulation, Frederick Sargent II, M.D.

Renal Clearance I: The Measurement of Glomerular Filtration Rate, Jack M. Ginsburg, Ph.D.

Renal Clearance II: Solutes which are Transported by the Renal Tubular Epithelium, Jack M. Ginsburg, Ph.D.

Understanding Renal Hemodynamics I: Description of Hemodynamics and Intrinsic Regulation, L. G. Navar, Ph.D.

Understanding Renal Hemodynamics II: Extrinsic Control, Capillary Dynamics and Measurement of Renal Blood Flow, L. G. Navar, Ph.D.

Several video tapes on physiological subjects will also be on exhibit.

Poster Session, Grand Ballroom, Convention Hall

Phyllis H. Bogner, Abdul W. Sajid and J. D. Clemmons. Univ. of Illinois College of Medicine, Chicago, IL. 60680. Relationship Between Habits and Traits of Medical Students and Performance on Examinations.

SECTION 7, VOLUME V, MALE REPRODUCTIVE SYSTEM - THE NEWEST HANDBOOK OF PHYSIOLOGY

In the past few decades we have witnessed the discovery of most of the modern knowledge on the male reproductive system. Spermatogenesis and its control, as well as the production of hormones by the testis, have been the focus of intensive investigation for many years. We now understand in great detail the sequence of events that transform relatively undifferentiated spermatogonia into highly complex spermatozoa. The synthesis and secretion of steroids by Leydig cells has been well characterized, and we are approaching an understanding of the finer mechanisms of this process at the subcellular level. In contradistinction to the testis, however, research on the excurrent ducts has gained momentum only during the past few years. Fundamental observations on epididymal sperm maturation that were made in the 1920s and 1930s virtually lay dormant for a quarter of a century, until the late 1950s when new interest developed. Over the past decade or so interest in sperm maturation has quickened and, as a consequence, research into broader aspects of epididymal function has also increased. That the rewards of the research have been ample are well shown in the newest volume of the Handbook of Physiology on the function of the male reproductive tract, edited by David W. Hamilton and Roy O. Greep.

The chapters in this volume provide an analysis of the biology of the mammalian male reproductive tract, beginning with the testis, proceeding through the epididymis to the accessory organs of reproduction. Thorough analyses are made of the process of spermatogenesis, the factors that influence it and the mechanisms by which it is controlled. The interrelationships between Sertoli cells and developing germ cells and the role of the blood-testis barrier are discussed in detail. The post-testicular maturation of sperm is considered both from the point of view of inherent changes that take place in sperm in the epididymis and of the epididymal and extra-epididymal influences that control the maturational changes. Detailed discussions are given of the process of steroidogenesis and of the metabolic interrelationships at the target tissue level that reflect the mechanisms by which hormones exert their influences in the male.

This newest volume in the Handbook Section on endocrinology is a profusely illustrated (358 figures) book of 527 pages, and should be available in March 1975. Its cost to non-members of APS is $47.50, but members may purchase it for $38.00 if they order directly from the Society's Business Office, 9650 Rockville Pike, Bethesda, Maryland 20014.

AMERICAN PHYSIOLOGICAL SOCIETY FALL MEETING

CCTOBER 5-10, 1975

SAN FRANCISCO, CALIFORNIA

The 1975 Fall Meeting will be held at the Sheraton-Palace Hotel, San Francisco. Registration will open on Sunday, Cctober 5, and sessions will be scheduled Monday through Friday, October 6-10. The deadline date for submission of abstracts is Wednesday, June 18. Detailed information and all meeting forms will be mailed to members of APS in mid-April. Non-members should clip and mail the Request for Forms to the APS Fall Meeting Cffice as directed below.

REQUEST FOR FORMS

TO: APS 1975 Fall Meeting Office
9650 Rockville Pike, Rm. 204
Bethesda, MD 20014

DEADLINE FOR RECEIPT OF ABSTRACTS: June 18, 1975

Abstract Sets (instructions, 2 forms, etc.) _____

General Information Leaflet _____
Hotel Reservation Form _____
Advance Registration Card _____
(Student eligibility on reverse of card) _____

Please print your name and complete mailing address with zip code.

CHANGES IN THE JOURNAL OF NEUROPHYSIOLOGY

With volume 38 of the Journal of Neurophysiology, a number of changes appear in the roster of those making up the Editorial Board. Especially conspicuous by its absence is the name of Dr. John M. Brookhart, former Chief Editor. The Publications Committee of the American Physiological Society takes this opportunity to express its deepest gratitude to Dr. Brookhart for the many years during which he unselfishly devoted his time and labors to maintaining and strengthening the outstanding position that the Journal of Neurophysiology occupies in the broad field of physiological sciences. Dr. Brookhart assumed the position of Chief Editor in 1964, and carried out the responsibilities of this position without interruption through the next 10 years. During this time he earned the very deepest respect of his associates on the Publications Committee of the American Physiological Society and on the Editorial Board of the Journal of Neurophysiology. His individual attention to each manuscript that appeared in the Journal became legendary, and many authors are indebted to him for the guidance that they received in improving their papers. In giving up his position as Chief Editor, Dr. Brookhart does not terminate his association with publications of the American Physiological Society since he, together with Dr. Vernon B. Mountcastle, has assumed responsibility for the neurophysiology section of the Handbook of Physiology, which is currently being prepared by the Society.

The Publications Committee also recognizes the long and valuable service of several other members of the Editorial Board whose terms ended with the last issue of volume 37. These Editors are: P. O. Bishop, Irving T. Diamond, Edward R. Perl, W. Alden Spencer, and Gerhard Werner. Though their names are no longer listed in the Journal, they will, in fact, continue to render assistance to the Journal of Neurophysiology when called on to review manuscripts in their areas of neurophysiology.

In addition to thanking the departing members of the Editorial Board, the Publications Committee takes this opportunity to welcome the new members of the Editorial Board and to comment on the new breadth which these members will bring to the Journal. The new members are Robert E. Burke, Edward V. Evarts (Chief Editor), R. W. Guillery, David A. Robinson, Urban Ungerstedt, and Torsten N. Wiesel. These new members will strengthen the Board by bringing to it expertise in techniques that are becoming increasingly important in neurophysiology. In earlier times, recordings of electrical activity provided the major advances in our understanding of the function of the nervous system, but today advances in neurophysiology involve the use of more and more diverse techniques, and the neurophysiologist may spend more time looking through the microscope than looking at the oscilloscope. The increasingly widespread use of anatomical and histochemical techniques in the solution of neurophysiological problems means that the scope of a journal of neurophysiology must become correspondingly broader in terms of the techniques employed in the research papers that it contains. As stated in the Information for Contributors, "The aim of the Journal of Neurophysiology is to provide a channel for the publication of original contributions on the function of the nervous system. Materials submitted may include any phase of the subject

amenable to experimental analysis." No technique is ruled out in this statement, and the Editorial Board, together with consultants selected on an ad hoc basis, will consider papers on the function of the nervous system regardless of the methods employed in the research.

Alfred P. Fishman
Chairman, Publications Committee
American Physiological Society

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FIFTH ANNUAL MEETING of the SOCIETY FOR NEUROSCIENCE

The Fifth Annual Meeting of the Society for Neuroscience will be held in New York City, November 2-6, 1975, at the New York Hilton Hotel. Symposia, volunteer paper sessions, tape/slide sessions, dinner discussion groups, and guest speakers will cover a broad range of neuroscientific subjects. Poster sessions will supplement the traditional 10-minute talks. Our Call-for-Papers suggests over 60 topic categories to which abstracts may be submitted. Sample topics are as follows:

Brain Stem; Invertebrate Neurophysiology; Membrane Biophysics; Neuroimmunology; Neuromuscular Junction; Somatosensory Systems.

Deadline for receipt of abstracts: June 2, 1975

For detailed information, write: Neuroscience Meeting Headquarters, Room 200 A, Lee Building, 9650 Rockville Pike, Bethesda, Maryland 20014.

THE ROLE OF PHYSIOLOGY IN HUMAN AFFAIRS*

MAURICE B. VISSCHER

The science of physiology has had a long history. In 1954 in his book, "Perspectives in Physiology" Homer W. Smith had the following to say:

"Physiology can lay claim to a long and honorable history, and it has contributed more than any other science to our present knowledge of the nature of man. In the days of old the Greeks had a name for our fraternity, which they called the physiologoi, a word compounded of physis, meaning nature, and logia, meaning discourse or knowledge. For the Greeks, however, physiologoi had a broader meaning than the term physiologist has today: there being as yet no specialization in science, the physiologoi encompassed all those who were concerned with a knowledge of Nature in any of her aspects .....the physiologoi we honor as the first men in recorded history who sought to understand their world in terms of law and order.

"As physiologists we are now twenty-five centuries removed from the physiologoi, and yet I suspect not so far removed that a cycle may not soon complete itself so that physiologists may again be physiologoi in the broader sense, as much concerned with nature as a whole as with the local turbulences in energy and matter which we know as life."

Undoubtedly the reason for the strong international flavor of the physiological sciences is the fact that these sciences have the greatest relevance of any field of science to the human condition. There are no political or geographic boundaries to knowledge about how living systems operate. They operate according to the same principles under any political ideology or economic system. In fact, as exemplified in our program this week, important discoveries in physiology have come from socialist as well as capitalist countries. Only when attempts have been made improperly to inject political ideology into scientific work has science suffered, and scientists have suffered as well.

Physiological scientists have been among the leaders and pioneers in international cooperation in their science. It is now eight-five years since the First International Physiological Congress was held in Basel. Ever since, except during the two World Wars, when travel was impossible, triennial Congresses have been held. The tradition of free movement of scientists across national boundaries has been an essential part of the policy of physiologists the world over. Unfortunately today there are such tensions between countries that there has been real difficulty in maintaining this tradition. However, physiological science cannot fulfill its proper and necessary role in improving the human condition unless this policy is maintained.

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* Plenary Session Lecture given at the XXVI International Congress of Physiological Sciences, New Delhi, October 22, 1974. Assisted by the Louis W. and Maud Hill Family Foundation.

In the interests of humanity at large, the free flow of scientific information, without regard to national boundaries or political or religious views is essential. Science knows no national boundaries and cannot possibly tolerate the intrusion of political or religious ideology into its fabric. To do so would be to repudiate the first law of scientific ethics, which is devotion to absolute honesty in reporting objective facts. The second law of scientific ethics may be said to be that a scientist is obliged to make his or her discoveries publicly known and to share information with all other scientists. The obvious necessary consequence of this ethic is that external political considerations will not be allowed to interfere with either the free flow of information or the free exchange of such information.

I realize that I am speaking as a foreign guest of our host country today, and therefore I want to say that the government of my own country has not been without fault in these matters. Fortunately I can say that in the field of physiology it has been possible, but not without great difficulty, to keep national foreign policy matters out of decisions regarding free flow of information and regarding participation in International Congresses. I can speak with direct personal knowledge in this matter because I was Secretary of the International Union of Physiological Sciences for the first six years of its existence, beginning in 1953, and was during that time and later, the Chairman of the United States National Committee for the IUPS. During that time I had very unpleasant experiences with the U. S. Department of State, and I therefore understand the problems of scientists in any other country in which so-called experts in diplomacy fail to see the necessity for unfettered exchange of scientific information and movement of scientists themselves attending scientific conferences dealing with absolutely universal human problems.

Having said this about my own government I hope that I will not be misunderstood when I say that it is regrettable that the government of India was unwilling to allow five physiologists from Taiwan who wished to participate in this Congress to come to New Delhi.

I want to say also that it is equally regrettable that the government of the Peoples Republic of China apparently did not allow any of its physiologists to come here. All of humanity loses when free exchange of scientific information is thus impeded.

Because of their longer history of international cooperation, the physiological sciences have perhaps a unique position among basic scientists with respect to the propriety and the need for maintenance of an absolutely neutral position with respect to race, sex, religion, nationality, and political and economic ideology in the free flow of information and the movement of persons. Perhaps by insistence upon guarantees of such impartiality on the part of governments in arranging for international congresses and conferences, physiologists may be able to play some small part in lifting the pall of fear of new wars from humanity.

The contributions of physiology to human welfare in the past have been very great. Not the least of its contributions has been its role in developing new sub-sciences which are useful to society.

Physiology has been the mother, so to speak, of several scientific disciplines which have in modern times become independently important. Physiological or biological chemistry, pharmacology, biophysics, nutrition, genetics, are all really physiological sciences in a broad sense. To be sure, such methodological disciplines as biochemistry and biophysics involve high degrees of specialization in chemistry and physics respectively. Interestingly enough modern biochemistry and even pharmacology have come to utilize highly sophisticated physical tools such as nuclear magnetic and electron spin resonance in their characterization of molecules and processes. They have become biophysicists. It is consequently becoming extremely difficult to distinguish between a biochemist or a pharmacologist or physiologist, and a biophysicist, in certain areas of expertise, if indeed such a distinction is thought to have any particular importance today. Biomathematics is also a splinter group from physiology and other biologic sciences. Not all users of sophisticated mathematics want to dissociate themselves from more conventional disciplines, but in many institutions biostatistics, at least, is a separate entity, partly perhaps because it deals with a single tool useful in many disciplines.

Splintering in scientific disciplines is a result of two major factors. The first is the desire and the real need to have easy mechanisms of communication between scientists with similar interests and specialized knowledge. This is certainly a very legitimate reason. The second is the practical consideration of monetary support within existing institutions, which is ordinarily greater for a formally separate discipline than it would likely be for a sub-discipline. This is also a legitimate practical reason. Perhaps it would not be improper to mention a third motivation, not quite so praiseworthy, namely the presumed greater prestige of a post in an entirely separate discipline. Human nature being what it is there is always a chance that human vanity may influence decisions of these types.

A bit of history is relevant at this point. When the international Union of Physiological Sciences was organized it was decided not to use the title "Physiology" in its name, but rather to encompass the larger field of all physiological sciences in order to allow the organization to be one which could contribute to the re-unification at the international organizational level of all of the groups which had sprung from the discipline called physiology a century ago. It was for the most part a futile gesture. Initially the pharmacologists joined the Union as a subunit, but the biochemists, biophysicists and nutritionists would have nothing to do with a consortium of this type. Very shortly the pharmacologists, too, withdrew their connection.

As the Secretary General of the IUPS for the first six years of its existence, and as one of the members of the earlier Permanent Committee for the International Physiological Congresses, which Committee laid the groundwork for the IUPS, I had something to do with spelling out the plan of its organization, particularly the plan for an integration of all of the physiological sciences at the international organizational level, I must confess now that our plan was too idealistic for the real world. Those of us who planned a structure for a worldwide reinte-

gration of the physiological sciences had no intention of attempting to reverse the obvious and necessary trends toward increasing specialization and separate meetings of specialists. All that we had in mind was a large umbrella organization which could represent all of the specialized groups in the International Council of Scientific Unions, and before UNESCO and the World Health Crganization.

In fact, the physiologists who were the architects of the IUPS foresaw the time when large International Congresses would one day become too unwieldy for effective operation as mechanisms for scientist-to-scientist communication and would gradually be either supplanted by or even better be supplemented, as they are today, by specialized open symposia and workshops dealing with limited areas of physiological science, organized to facilitate international communication and interdisciplinary cooperation. But for the reasons suggested before, and perhaps others, the time was not ripe for a real rationalization of the international organizational structure of the total physiological science enterprise. The fact that the International Unions in Chemistry and Physics had been able to hold together the great diversity of their subdisciplines at both national and international levels encouraged us to believe that similar arrangements could prevail in the biological sciences, but we were wrong.

Consequently the IUPS must play a different role, one of integrating knowledge concerning the behavior of living systems at the intellectual rather than at the organizational level. Perhaps this is a fortunate circumstance because it leaves physiology as the conceptual center of that major portion of biological science that deals with function and process in their broadest meanings. The intellectual future of the science of physiology is not in doubt, despite the fact that its mundane organizational compass has been diminished by the splitting off of so many subdisciplines whose practitioners find practical advantage in separate identification. Still there is an important place for the company of scholars whose interest is in the synthesis of all applicable techniques of physics, chemistry and mathematics to an understanding of vital processes, and who do not limit their intellectual horizons to the use of single types of exploratory tools. There is a great intellectual challenge for future physiologists to be the guardians of the broader views of the science of function in living systems. I take this view despite the fact that in some countries, my own for instance, the current mood is to look upon physiology as a dying separate discipline, being supplanted by its numerous offshoots and specialty fields.

Let me illustrate with some specifics. The U.S. National Academy of Sciences has had serious proposals to eliminate Physiology as a separate Section in its organizational structure. Furthermore in several American medical schools most, or even all, instruction of undergraduate medical students is carried on by members of the faculties of clinical medical departments. In these schools only the handmaiden role in relation to medicine can be carried on.

In the case of the U. S. National Academy of Sciences the proposed elimination of the Section of Physiology is based on the historical fact that a new Section of Medical Sciences has been created and the supposition, which I believe to be unfounded, is that most physiologists are appropriately classed simply as medical scientists. Of course, many physiologists in the U. S. and elsewhere in the world are based in medical schools and in medical research establishments, but physiology is not simply the handmaiden of clinical medical science, despite the fact that modern clinical medical science would fall to the ground if it did not have a strong physiological science base.

Physiology has a much broader scope in the spectrum of the natural sciences. It is first of all the major pillar of the science of life upon which all philosophy about the nature of the living world including the nature of man must rest. Furthermore, many more applied sciences aside from medicine, including the veterinary sciences, the behavioral sciences and even such practical matters as insect pest control depend upon it for their progress and intellectual validity. Dealing only with animal physiology for the moment, it is obvious that animal husbandry in general depends mainly on physiological science. Animal breeding, animal nutrition, animal behavior must employ physiological knowledge. In the behavioral sciences too, knowledge of the various functions of the nervous systems of all species of animal, including Homo sapiens, is at the base of all solid knowledge.

Today the problem of the growth of the world population is a major one for the future welfare of mankind and will be considered at greater length in another Plenary Session. As to methods of solution, they involve fundamentally scientific rather than medical problems, although physicians who are scientifically trained and also other professionals, are essential to an implementation of its solution. The physiologists have already provided the knowledge necessary to prevent conception or to bring about failure of implantation of ova in the human as well as in other animals. Without doubt applications of existing and new physiological knowledge could allow the population problem to be solved.

The question today is whether the world population is ready to implement solutions. A more thorough understanding on the part of the great masses of humanity of the scientific facts about conception-control, effects upon sexual behavior - such things as sexual drives, sexual satisfaction in both sexes, for example, - would allay groundless fears. However, there is obviously another dimension to the problem. There are cultural taboos which must be overcome if the population control problem is to be solved. And there are fears that population control may be used improperly to the disadvantage of some racial or political groups.

We, that is the human race over the world at large, spend about a tenth of our total annual gross economic product on armaments and military protection and activity. Some nations spend larger fractions and some smaller. This is all done to forestall catastrophe to national sovereignty. What does the human race spend on forestalling the catastrophe of too many mouths to feed and too little food to sustain them in health and happiness? In the United States we spend roughly fifty times

as much on thermonuclear arms alone as we spend on population control, including both research and implementation. Even in India, where the disparity between population and the means to sustain it is so very much greater, it seemed to its government nevertheless to be necessary to develop thermonuclear explosive capability. There is an obvious disparity between real long-term priorities and current allocations of money and effort, not only in India but in the United States and many other countries as well.

Rationality, as opposed to rationalization, must be based on the most solid information and facts known to man. Although many other branches of science contribute to the pool of verifiable knowledge that is science, physiology has a unique place in connection with the population explosion dilemma. This is true because the only plausibly acceptable present means of population control are based on physiological discoveries, and future investigations will undoubtedly improve presently available tools.

Physiological advances have also had the greatest impact of any field of science on rational views of the nature and place of man in the hierarchy of living things. Perhaps no single set of scientific discoveries will have in the future more impact on the thinking of all men than the discoveries of recent years concerning the intimate molecular mechanisms of heredity and morphogenesis. The fact that variants of the same fundamental chemical mechanisms occur in all forms of life, and that the genus Homo sapiens is no exception, puts the stamp of scientific validity upon views as to the origin of man which depended before upon much less substantial, even if quite persuasive, inference from less direct evidence. It has now become impossible for an informed rational person to doubt that all living things acquire their capacity for replication by the same general chemical mechanisms, and that mutation at the chemical level which can now be induced can be the basis of what we call evolution.

Education of the public about the broad science of physiology can contribute much to the enlightenment of the human race. There has been a school of thought popularized by C. P. Snow's writings about the two cultures, scientific and humanistic, which has attempted to divide society into incompatible fractions. I do not subscribe to Snow's views for two reasons. First because I do not think that anyone can be called educated in a liberal fashion today without being introduced explicitly into the methods of science and learning more than superficially about the achievements of scientific research in gaining knowledge about the physical universe and especially about the nature and mechanisms of living forms, including man. In other words a person really uninformed about science is an illiterate in the modern world. Second I reject the implications of the Snow thesis because I see no incompatibility between a scientific and a humanistic culture. I think rather that for every well-integrated, well-educated and ethical person the scientific and the humanistic elements inevitably fuse into a harmonious unity.

One of the great challenges to physiologists today and in the future is to make the broad outlines of their science understandable and understood by the layman. The most important reason for this is the fact that no one can think rationally about the world and man without factual knowledge about the nature of man and other life on this planet. It is true that physiology and all biological sciences are still in the process of development. There are still many gaps in factual knowledge, but the existence of gaps does not justify ignoring the clear implications of the factual knowledge that does exist. One cannot logically substitute fancy or sentimental desires into gaps in verified knowledge in building a world view, and still call it rational. Wishful thinking has never had a place in science, and it cannot have a place in any philosophy incorporating science in its basic assumptions. Saying this I disavow any intention to propose that in our present state of knowledge we can, in physiology or any other science, answer all important questions in any particular field.

Since the nature of man himself has the greatest interest and importance to any philosopher, professional or non-expert, in which latter category all rational persons fall to one degree or another, it is obvious that physiology must hold the greatest interest to men and women because physiological science can already give factual answers to so many interesting questions about the nature of the human animal and his origins and destiny. As already noted, we have learned the mechanism by which genetic information is passed to offspring, we know that the principles of genetic coding are common to all life, we know that certain types of cells when mature do not replicate themselves, as in the central nervous system and in consequence their loss by accident or disease produces permanent and irreversible defects. We know much about the effects of chemical transmitters and other chemical agents, including drugs, upon the function of the central nervous system. In short, the mind and personality need not be looked upon as "Black Box" phenomena, understandable only by remote inference. To be sure we are far from full understanding of the human mind, but that is one of the great challenges for the future. There is already a large body of knowledge in physiological psychology, enough to assure us that particular normal behavioral patterns depend upon the integrity of certain central nervous system structures and pathways, as for example, those produced in the Klüver-Bucy syndrome after ablation of very specific limited parts of the cerebrum in sub-human primates, which symdrome has counterparts in human disease states.

There is a huge area of knowledge still to be won in the physiology of the brain in connection with higher central nervous system function. It will occupy many scientists for more than the foreseeable future to bring this field to equality in progress with other aspects of physiology.

Nervous and mental diseases are among the greatest scourges of mankind. The advances already achieved in alleviating much suffering, as for example by the introduction of newer drugs which have greatly reduced the need for hospitalization of mental patients, represent a very great boon to mankind. Furthermore, genetic counselling based on newer knowledge in genetics can in the future greatly diminish the size of the defective genetic pool in the human race.

Ethical considerations in the study of human subjects make it necessary that much basic research be performed on sub-human animal species because physiologists and other scientists respect the rights of every individual human being. Human subjects must be protected against any violation of their rights. This necessitates great caution in the study of human subjects in every field and accounts in part for slowness in progress in the neurobehavioral sciences.

I have insisted that physiological science is more than a handmaiden to medicine. I do not wish to leave the impression that that role is not very important. It is as important as health is to men and women everywhere. Of course, physiology is not the sole key to health or its restoration. Other disciplines, such as microbiology, have made as much as, and perhaps in some respects more important practical contributions to medicine than has physiology. Certainly the conquest of the scourges of epidemics of infectious diseases has had the greatest effect upon the lengthening of the average life expectancy at birth. In fact it is the near obliteration of so many lethal infectious diseases that has produced the population explosion that now threatens the needed balance between food supplies and human needs. The advances in microbiology and the resultant applied measures to control transmissable infectious disease have been boons to the welfare of individuals, but they will be catastrophic to the human race as a whole unless compensating measures are taken to prevent uncontrolled population growth. Those measures require the use of newer physiological knowledge. In other words, physiology may, or rather must, as it appears today, provide the knowledge to undo the global damage that the conquest of epidemic infectious diseases has wrought. Each discipline will then have contributed its mission of mercy.

It may be noted, because it is particularly important to the sub-continent of Asia, that in the case of one infectious disease, namely cholera which is prevalent there, a physiological approach to the problem of treatment has reduced the fatality rate of the disease to practically zero in victims who can reach medical facilities before they are moribund. This was accomplished by learning the details of the electrolyte disorder in cholera patients and correcting it promptly and maintaining the correction throughout the course of the acute illness. In other words until the reservoirs of carriers are eliminated and improvement in water supply and other necessary sanitary measures can be carried out, the diagnosis of cholera need not be a probable death sentence. This is thanks to the work of physiologists.

Aside from infectious diseases, neoplasia and functional or metabolic disorders - the latter broadly defined - are the major causes of death and disability in the human race. Neoplasia may be at least in part an infectious disease, but there can be no doubt that it is also in part, perhaps in major part, due to a breakdown in the normal mechanisms for rejection of "foreign" cells. Neoplasia can also, obviously from careful studies, be the direct result of environmental insults, including radiation and chemical agents. Here again, however, the likelihood exists that failure of the immune system plays a role in determining which individuals will support a neoplastic tissue and which will not. The production of antibodies is obviously a physiological process and although

immunology as a discipline is not a part of what most physiologists delve into, from a broader intellectual viewpoint immunology is obviously a branch of physiological science. Organic or cellular disorders of function of either genetic or environmental origin cannot be investigated or ameliorated or cured without physiological research. Under the rubric of organic disorders come the mine run of problems of medical practice. Acute infectious diseases lead to the symptoms of organ pathology which bring patients to physicians. And it is because antibiotics and other anti-infection agents affect the metabolism of the cells of an invader differently from the way they damage the host that such agents are useful.

One must consider the role of physiology in controlling such disorders as arteriosclerosis, hypertension, thrombosis, renal dysfunction, hepatic dysfunction, endocrine dysfunction including diabetes, hypo- and hyperthyroidism, gonadal and adrenal dysfunction, associated nervous system dysfunction and many others in connection with either genetically or environmentally induced disorders. It should be noted also that such processes as heart failure, lung disease or renal dysfunction may be the result of infectious disease but it is the physiological disorder that is the crucial clinical problem.

In order to begin to understand the mechanisms of a disorder one must first know something about the normal function of a cell, a tissue, an organ, an organ system and the intact organism, as well as the chemical processes that go on normally at the various levels of integration. Consequently, knowledge about normal physiology is a first prerequisite to any useful understanding of disease states.

There is a source of conflict between supporting agencies and scientists as to what priority should be given to studies of normal, as opposed to pathologic physiology. Actually the disagreements are to some extent only semantic, because one frequently studies normal function by creating small or large abnormalities, and no one can possibly study abnormal function without comparing it to the normal. Nevertheless there is a real problem because in a pragmatic society higher priorities are apt to be accorded, even by scientists on review boards which control funding, to proposals that stress the applied rather than the basic science aspects of contemplated work. And in the United States, at least, Federal government funding is at present limited to proposals given the highest priority by committees which rate them. Thus, well conceived basic studies may get no funding whatsoever while more mediocre plans with larger elements of applied interest may be funded generously. Speaking again of the United States, about the funding situation in which I am most familiar, there has been only one funding agency in the government, namely the National Science Foundation, in which the primary justification for their appropriations by the Congress has in the past not been the promise of early achievement of useful applications. And yet recently, in order to bring about larger appropriations from the Congress, the NSF set up a special applied science program, designated the RANN program (Research Applied to National Needs), thus joining the other agencies such as the National Institutes of Health, the Department of Agriculture and others in judging research on the basis of its

likelihood of yielding practical results. To the credit of the administrators of some of these agencies, particularly in the National Institutes of Health, it must be said that they have in the past taken a very long-sighted view of these matters and have supported much pure science. They have furthermore used their influence with the members of the Congress to keep the mandates for administration of funds flexible enough to permit such discretionary actions. Actually in the United States, the greatest current problem with regard to funding of basic science lies in the decisions over the past five years in the Executive Office of former President Nixon to reduce total appropriations and to increase greatly the fraction of available funds given over to contract research on specific applied problems, which in the absence of overall increases in appropriations, have resulted in effective large decreases in funds available for grants-in-aid for research in academic institutions. Thus the funding for specific applications, probably more appropriately called development rather than research, has increased, and the fraction and the total amount for basic research has decreased. It is perhaps not inappropriate to note that these decisions of the Office of Management and Budget make large appropriations available to "for-profit" corporations rather than to the universities and to non-profit research institutes which previously received the lion's share of funds for biomedical research from Federal sources. Hopefully this aberration may now be short-lived. Scientists in other countries should be alert to the fact that education of the lawmakers in their own countries as to the realities of the conditions for optimal progress in science, pure and applied, is an absolute necessity in modern times. Science is no longer the esoteric pursuit of the eccentric. It is a central feature of the human condition. It is true that science and technology have been condemned as the perpetrators of many human ills by a minority of people. The very fact of the accusation is, however, a recognition of the fact that science and technology have become central to human life. No one can know whether science can save mankind from oblivion. All that one can say with some confidence is that no other human activity has any plausible chance of rescuing humanity from its fate if rational science cannot do it. We in the world have too much worldwide destructive power, too much irrational nationalistic fervor, too much individual selfish greed, too much divisiveness, to make it thinkable that humanity can survive in its present state without a lift from the rationality that science could provide it.

Since the nature and the state of man is the most crucial problem in the human world, it is a question for the physiologists of the world to ponder as to whether they cannot or should not take a major responsibility for public education as to the role of all science, but particularly the physiological sciences in meeting the problems that global human society faces.

Physiological scientists can properly define the relationships between nutritional needs and healthy population possibilities. They can provide knowledge about acceptable mechanisms for population control. They can define the relationships between various types of environmental pollution and disease. They can also supply the basic knowledge necessary to permit the prevention and/or cure of many human diseases.

It will be the responsibility of a wider constituency, however, to decide what advice they will accept from the scientific community. Nevertheless, the scientists themselves have an ethical obligation to disseminate the truth, and the whole truth as their studies permit them to see it. In recent years a number of biologists in the physiological sciences have spoken out forcefully in connection with the ethics of the scientific enterprise. A central theme of Jaques Monod, Bentley Glass, Van Potter and others is that inherent in the nature of science is the obligation to be totally truthful - it is the essence of science that only independently verifiable facts are actually facts - and the obligation to transmit new knowledge to others, unvarnished and honest in every detail.

The built-in necessity for candor and honesty in scientific reporting - if a scientist is to have any standing with his or her peers - must of necessity be extended to equal candor and honesty in disclosure to the wider community if a person is to maintain credibility as a scientist in the community at large. The natural sciences may be the reservoir of candor and honesty which world society needs today to rescue itself from the morass of half-truths, absolute falsehoods and self-serving policies of politicians over much of the world. A new standard of ethics in honesty and candor is needed over the world at large. There is no human enterprise in which honesty is more obviously and more immediately not only the best policy but the only standard of behavior that is tolerable at all, than in science. Hopefully, scientists may be able to influence, by paying more attention to public education, the attitude of the great masses of people toward acceptance of scientifically based solutions to the great problems facing human society today.

One must be an optimist in order to retain one's good humor and sanity in the world today. One can be an optimist if one believes that the basic ethic of science, namely honesty, can permeate the larger society. I do. I think that there is a rational basis for hope that rational solutions of global human problems will prevail. This position of mine is in spite of my personal opposition to all of the U.S. military and para-military adventures in foreign affairs since 1945 - Korea, Vietnam, Cambodia and the rest of the less openly admitted interventions. I mention my personal views and disappointments only to emphasize the fact that I still have a confident hope that, given some help by more education, the majority of members of the genus Homo sapiens, will opt for rational rather than for purely selfish emotional solutions to the major problems facing humanity today. I think that the physiological sciences, and especially the physiologists of the world as persons, can and must play a role in creating both a more healthy world and a saner world. There is no question about the capacity of the physiological sciences to assist majorly in creating a healthier world. Whether the world can be nudged toward greater sanity about problems that involve the survival of the human race is more dubious, but if humanity is spared a thermonuclear holocaust one can reasonbly believe that increased knowledge about the nature of man and other living things may help in promoting sanity on all fronts - interpersonal and international.

I think that physiologists, dealing with all aspects of the mechanisms and behavior of living systems, have a crucial role to play in the future. That role is not limited to the research laboratory. It includes teaching at all levels, including instruction for the non-scientist, and it includes also exerting a sanitizing influence on public policy on many issues in which knowledge of what one may call literally and not figuratively the "facts of life" is important. I hope that eighty five years from now an International Physiological Congress may see as much progress as we see today from the beginnings of the Basel meeting that many years ago, and that in the meantime physiologists may participate fully in the unification of the scientific and humanistic aspects of our culture so that the overall human condition can be improved. We who live and work today owe no less to the coming generations.

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WOMEN IN THE BIOSCIENCES - A BRIEF PRIMER

M. ELIZABETH TIDBALL

There is no way that one short article can bring together the large amount of data which has been accumulated in reference to the education and employment of women, either in general or in the biosciences in particular. This is because the material available arises from many disciplines; hence an understanding of the situation of women in science necessitates an interdisciplinary approach. The synthesis here is therefore but one of many possible combinations and permutations, akin to the writing of several short field review articles simultaneously with the many choices each alone would have required, compounded by the number of contributing disciplines. Nonetheless, it seems advantageous and appropriate to attempt the task as a first step towards increasing an appreciation of the needs and constraints which have hindered or prevented the optimal participation of women in the sciences and the full expression of their capabilities.

Some researchers have identified particular points in the educational progression which are most likely to be associated with attrition of girls and young women from the pursuit of science. In the early years, lack of encouragement of girls to take mathematics courses can be shown to have far-reaching effects on subsequent participation in or enjoyment of science studies. At all levels, fewer girls than boys proceed to the next step of schooling (junior high to high school, high school to college, etc.) (1) in spite of the fact that girls consistently receive better grades than boys at all levels (2). At the college level, when greater focusing on careers occurs and comes into closer alignment with perceptions of one's talents and interests, young women regularly find themselves caught between the cross-pressures of marriage and career. While society expects men to have a career whether or not they marry, it also expects women to marry whether or not they have a career. Such expectations make career assessment both difficult and confusing. In addition, on most college campuses, there are relatively few adult women role models through whom the young woman can glimpse the realities of and possibilities for non-biological achievement. Not only are there fewer women faculty, but they are predominantly in lower level positions where there are fewer opportunities to gain esteem for their professional accomplishments. Studies have shown that women who graduate from women's colleges are more likely to proceed to post-college career achievement or to earn a doctorate in any field including the biosciences than are women who graduate from coeducational institutions (3, 4). One of the chief reasons for this is found in the women faculty/women student ratio which is strongly and positively correlated with future achievement of women graduates. These data have been widely interpreted as a statistical confirmation of the role model theory, and serve as a basis for encouraging the affirmation of women in both undergraduate and graduate environments. As is the case for women students, the higher the level of education, the fewer the number of women faculty and administrators.

Many hurdles have thus already been crossed by the young woman who has completed college and gained admission to a graduate program.

This is particularly true of women who enter the sciences for, as Perrucci has pointed out, career identity and male sex role identity are most strongly linked in the sciences (5). Keller (6) uses the language of scientists to illustrate this linkage:

> To the extent that analytic thought is conceived as "male" thought, to the extent that we characterize the natural sciences as the "hard" sciences, to the extent that the procedure of science is to "attack" problems, and its goal, since Bacon, has been to "conquer" or "master" nature, a woman in science must in some way feel alien.

That alien feeling may be ameliorated in part through the presence of achieving women role models and through the establishment of colleague bonds in the academic environment. The importance and critical nature of a significant mentor-mentee relationship has been reviewed by Robin with respect to men (7). That such relationships are also critical for women emerges from the statistical data of Holmstrom and Holmstrom (8). In a study of 300,000 graduate students, the Holmstroms found that more women than men stated they have considered withdrawing from graduate school. This finding was not correlated with their academic performance either in college or in graduate school. It was not correlated with family pressures: fewer women than men were married and had children, and more men than women reported that pressure from their spouse might be a deterrent to completion of graduate studies. Nor was it correlated with financial problems. Rather the Holmstrom study found strong correlations between overall ratings of satisfaction with every aspect of graduate school and close interaction with faculty members: lack of faculty availability and negative faculty attitudes were related to the woman student's consideration of withdrawal from graduate school and her ambivalence. Further, in this study, men graduate students more than women thought that the female students in their department were less dedicated than the males, thereby adding peer disapprobation to the already negative ambience.

Thus it can be seen that there are socio-cultural and psychological barriers to women as well as structural and pragmatic ones. Yet there are women who manage to complete their doctoral degrees and go on to the next hurdle, professional employment. Those who go the route of the postdoctoral fellowship are very few indeed, only 2-3% of such fellowships being awarded to American women. Upon the most cursory glance at the principal publication on postdoctoral study, The Invisible University, (9) it is evident that the report is written exclusively by and for men. By this time the "climate of unexpectation" articulated by Dr. Mary Bunting of Princeton has become full-blown.

It is from such a climate and throughout such an educational process that women physiologists emerge, some 67 or 19% of the physiology doctorates in 1973 (10). Over a ten year time span, Astin has shown that 91% of women with doctorates work, 81% of them full time (11). And from National Science Foundation data (12) it is learned that the kinds of employment women bio-scientists enter and their relative distribution within

these areas are similar to those for men, with most scientists located in educational institutions. More men than women are in industrial positions (11% men, 4% women) and more women than men are unemployed and seeking employment (8% women, 2% men). In an extensive study of women and men science graduates from the University of Michigan (13), it was concluded that women with new doctorates experience greater difficulty than men in acquiring satisfactory positions, a finding particularly true of married women with Ph.D's. This is duc in part to the fact that a woman Ph.D. is more likely to have a Ph.D. husband than is a man Ph.D. to have a Ph.D. wife; thus the problems of finding satisfactory employment for two people simultaneously affect women Ph.D.'s more than men. Further, opportunities for creative part-time employment for one or both spouses are difficult to find and generally discouraged by the nature of the prevalent reward systems.

Yet even when women and men academic professionals are matched for a combination of measures of productivity, level of academic attainment, demographic characteristics and the like, the reward system does not operate the same for women and for men. Members of the Berkeley Department of Statistics have analyzed the salaries of more than 60,000 women and men faculty located at 78 universities, 168 four-year colleges, and 57 two-year colleges. Using regression on 25 predictor variables and comparing the estimated salary of a man and a woman of the same ability and performance, they found that women tend to be paid less by about $1500 annually on the average, and often the discrepancy is greater. The salary difference is more pronounced in the research universities, in the biological and physical sciences, and at the higher levels. The authors state: "Recalling the very good fit of the multilinear regression equations to the actual salary, as evidenced by the high R^2, we must conclude that there is sex discrimination in faculty salaries..."(14). A simpler measure of affirmation may be found in the membership roster of the American Physiological Society: while some 84% of doctorates in physiology are held by men, 93% of the Society's members are men.

A few years ago, personal accounts of discrimination were discounted as evidence for what has since been shown, through research, to exist. Today, in the midst of the data which document the difficulties, such anecdotal material may once again be helpful, this time to attest to the possibilities, productivity and satisfaction which can occur when women are admitted as full partners into the scientific community. Several examples follow, taken from the New York Academy of Sciences Symposium on Women in Science (15).

> "To work outside my home in a liberated profession (architecture) implies extra effort but never a sacrifice, since this is what I want to do. If I could start all over again, my choice would be the same ..." - Gretchen Minnhaar

> "My husband is man enough not to be threatened by his wife's awareness of electrons; indeed he takes for granted that her interest in them can be just as deep as his in differential geometry, without its adversely affecting her femininity nor disqualifying her for her role of wife and mother. Clearly his attitude and encouragement have played a key role in making possible the life I lead."-Betsy Ancker-Johnson

"Why am I in this field? Because I like it. This was not considered sufficient reason for a woman to enter the mathematical field when I received my education .....At my first few meetings I experienced the same phenomenon I had experienced with the men students at Harvard University. The men were unable to interact with me mathematically because they had no social practice doing it. Gradually...they became interested in what I was doing as a colleague..." - Marian Boykan Pour-El

"My experience at TBC (Temple Buell College, now Colorado Woman's College) demonstrates the enormous importance of women as role models for women students. Prior to my appointment , all of the physics, chemistry, and mathematics faculty had been men. The highest professional aspiration voiced by any student then was to become a laboratory technician! Not only was I able to encourage the girls to go on toward a professional career, but I convinced my closest colleague in the Department that encouragement was both necessary and worthwhile. Although he was not himself prejudiced in any way, he had failed to realize that most girls need encouragement to overcome the tremendous pressures that have been built up in them." - Ruth Weiner

"The only personal ambition I ever recollect having was that of doing something worthwhile, no matter what it was. I think I have... difficulty in separating work from play, so satisfied am I with the kind of professional life I have." - Mary S. Calderone

"In my job, I have found one main compensation, without which I would retire tomorrow morning, regardless of whether I could afford it. My small laboratory, which I have forged out of nothing and on a shoestring, consists of about 15 persons, all young, bright, creative, eager, and wonderful people, nearly every one of them under 35 years of age. Some are my own former students and some presently still are students, from the high school up to the Ph.D. dissertation level. Together and individually, we fly in research aircraft through thunder-storms and hurricanes. We carry out cloud-seeding programs...We study the cumulus cloud engines that drive severe storms, with tools ranging from satellites through aircraft to computers, and turn out research papers, public talks, articles, and seminars at the rate of dozens per year." - Joanne Simpson

"I have been completely happy and content with everything I have been doing these last four and one-half years as a professor of electrical engineering - directing a fairly extensive research group of graduate students, teaching graduate courses, running the research seminar, doing service around MIT, and so on. Very recently a new opportunity presented itself: becoming associate department head of Electrical Engineering.....My marriage has been an exceedingly happy one. My husband (a physicist) is deeply interested and supportive of my career, and my children have also been raised to enjoy the benefits of a working mother.....I do not feel any conflict of interest between family and career, since I always think of them as an integrated package." - Mildred Dresselhaus

Cne might have concluded from the research findings that women should be discouraged from aspiring to careers in physiology. But, from the life experiences of women who have achieved a measure of successful integration, one might instead adopt the position that the difficulties do have remedies, and that the participation of women in science on more equitable bases can benefit both women and men, both in science and in the wider society.

In summary, it is hoped that this brief overview of what is, may serve as a point of departure for what can be: the freeing of minds from past prejudices and preconceptions in order that the most creative human endeavors can be realized. As educated persons who have a particular expertise and understanding of the roles of science and scientists in the society, we have perhaps the most to offer toward the development of a more humane environment for all people.

Acknowledgements:

The stimulus for this article was the Round Table Discussion held by the Task Force on Women in Physiology at Albany, New York in August 1974. Members of the Task Force who contributed information and ideas for that occasion are Drs. June Barker, Virginia Fiske, Elizabeth Carlson Gerst, and Florence K. Millar. Their input then and their continued impetus for the writing of a related paper are greatly appreciated.

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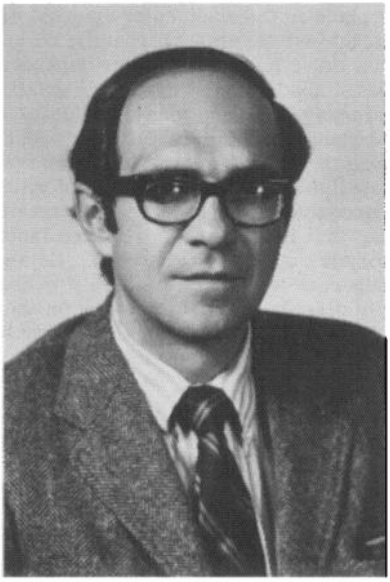
PETER F. CURRAN

(1931-1974)



THE MAN AND HIS MARK

STANLEY G. SCHULTZ

Peter Ferguson Curran was born on November 5, 1931 in Waukesha, Wisconsin. He died at the age of forty-two. His professional life, albeit brief, was rich with achievements and distinctions. During his scientific career, the field of epithelial physiology grew from infancy to adulthood. His milestone contributions are inextricably woven into that epoch of growth; his mark is indelible.

* * *

Peter Curran joined Arthur K. Solomon's Biophysical Laboratories at the Harvard Medical School as a graduate student after receiving his A. B. from Harvard College. The year was 1954. The previous five years had witnessed the birth of modern epithelial physiology under the brilliant and inspirational leadership of the Danish physiologist, Hans Ussing. A theoretical framework, firmly rooted in both classical thermodynamics and Nernst-Planck kinetics, was established for the analysis of transport across all membranes, which was particularly well suited for the study of ion transport across epithelial tissues. The work of the Copenhagen school (12) together with the considerations of

Rosenberg (9) appeared to have provided relatively unambiguous criteria for the distinction between active and passive transport.

By 1955 it was well established that water absorption by small intestine could take place in the absence of external differences of water activity as well as against adverse hydrostatic or osmotic pressure differences and that these movements were dependent upon metabolic energy. Thus, water absorption satisfied all existing criteria for an active transport process! But, to many, including Pete Curran, this was a distasteful conclusion. In 1957 Curran (with Solomon) published the research leading to his Ph.D. (granted by Harvard University in 1958) and threw new light on the mechanisms of water absorption (4). He demonstrated unequivocally that water absorption was not an independent process but that it was somehow linked isotonically to the simultaneous absorption of solute (Figure 1). He and Solomon concluded that " ...the transport of water is a passive process depending entirely on the absorption of dissolved substances and on the gradient of water activity." Within a very few years this conclusion became a truism, generally applicable to all animal epithelia.

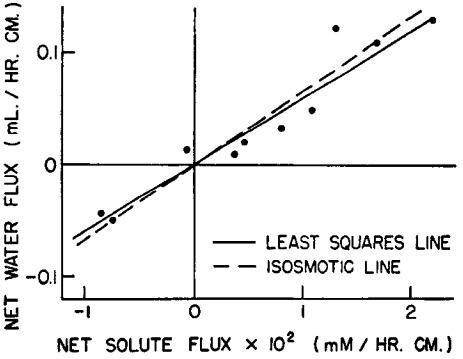


Fig.1. Relation between net water flux and net solute flux across in vivo rat ileum. Positive values indicate absorption and negative values indicate secretion. (Reproduced by permission of the Rockefeller University press from (4)).

But, in 1957, Curran was far from satisfied; several perplexing problems remained to be answered. What was the nature of the coupling between water flow and solute flow? How could this interaction bring about water flow against large differences in hydrostatic or osmotic pressure? In 1958, he journeyed to Copenhagen for a two-year stay in the laboratories of Hans Ussing. There, drawing upon the work of Staverman (11), he laid the groundwork for the "double (series)-membrane" model for biological water transport (Figure 2) which was introduced in 1960 (1).

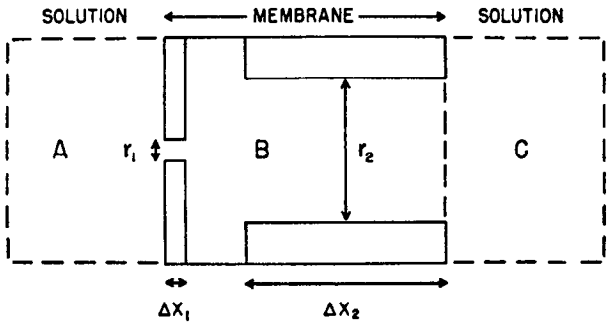


Fig.2. The original series-membrane model. Active transport of solute is assumed to take place from compartment A to compartment B across a thin membrane having thickness Δx_1 and an equivalent pore radius r_1. Egress of transported solute and water from compartment B to compartment C is via a long channel having a large equivalent pore radius, r_2. The similarity between compartment B and the lateral intercellular space is evident. (Reproduced by permission of the Rockefeller University Press from (1).)

1958 was a milestone year in the history of membrane physiology and in Pete Curran's life. That year, Cra Kedem and Aharon Katchalsky brilliantly thrust the formalisms of linear nonequilibrium thermodynamics onto the biological stage (6). This was what Curran needed. He now had a new language ideally suited for a formal expression of the concepts embodied in the double-membrane model. He returned to the Biophysical Laboratories in 1960 and, with McIntosh and Cgilvie, set about testing and formalizing the model (3, 7). The test system was simple. It consisted of three compartments separated by two barriers arranged in series (Figure 3), one a cellophane membrane (α) and the other a sintered glass disc (β). The central compartment B was filled with 0.5 M sucrose and was then closed to the atmosphere. The concentrations of sucrose in the two open compartments (A and C) were varied. Volume flow from compartment A to compartment C was observed when the concentrations of sucrose in the two outer compartments were equal and even when the osmolarity of compartment A was fifteen times that of compartment C. This artificial system was capable of "passively" transferring volume against an osmotic pressure difference of roughly 0.5 Osm or a hydrostatic pressure difference of roughly 10 Atm; it mimicked the "active" characteristics of biological water absorption.

The system illustrated in Figure 3 was described with the following equations (7):

$$J_{V\alpha} = J_{p\alpha}\left((P_A - P_B) + \sigma_\alpha RT\,(C_B - C_A)\right) \quad (1)$$

and

$$J_{V\beta} = L_{p\beta}\left((P_B - P_C) + \sigma_\beta RT\,(C_C - C_B)\right) \quad (2)$$

where

$J_{V\alpha}$ and $J_{V\beta}$ are the rates of volume flow across the membrane α and β respectively (flow from A to C is defined as positive)

L_p is the hydraulic conductivity

σ is the Staverman reflection coefficient

P is the hydrostatic pressure

C is the osmolar concentration

subscripts A, B and C designate the compartments shown in Figure 3; and subscripts α and β designate the two membranes

R and T are the gas constant and absolute temperature respectively.

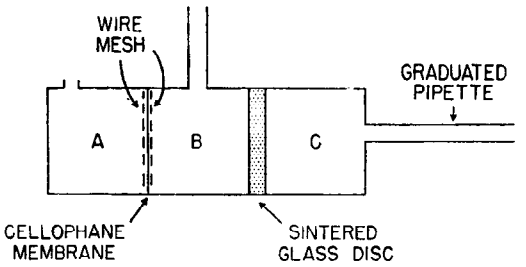


Fig.3. Test system for the series-membrane model for biological water transport. Compartments A, B and C correspond to those given in Figure 2. From (3).

When a steady-state volume flow (J_V) is achieved, $J_V = J_{V\alpha} = J_{V\beta}$ and when $P_A = P_C$

$$J_V = J_p\left[\sigma_\alpha RT\,(C_B - C_A) + \sigma_\beta RT\,(C_C - C_B)\right] \qquad (3)$$

where L_p is the overall hydraulic conductivity of the two series membranes and is given by $L_{p\alpha}L_{p\beta}/(L_{p\alpha} + L_{p\beta})$.

Clearly, when $C_A = C_C$ equation (3) reduces to

$$J_V = L_p\,(\sigma_\alpha - \sigma_\beta)\,RT\,(C_B - C_A) \qquad (4)$$

Thus, there will be volume flow from A to C providing $C_B > C_A$ and $\sigma_\alpha > \sigma_\beta$ even though the hydrostatic pressures and solute concentrations in compartments A and C are identical. Also, it is clear from equation (3) that volume flow from A to C can take place even when $C_A > C_C$ (i.e. when A is hypertonic with respect to C) providing $C_B > C_A$ and σ_α is sufficiently greater than σ_β.

Thus, the active transport of solute into a constrained intraepithelial compartment that is bounded by two barriers having different reflection coefficients can bring about solute coupled water absorption against adverse osmotic or hydrostatic pressure differences. A direct link between water flow and metabolic energy need not be postulated to account for this uphill movement; the necessary energy can be derived indirectly via osmotic coupling to the flow of solute. Further, as later shown by Patlak et al. (8, 10) such a double-membrane system is capable of elaborating an isotonic "absorbate." A question of paramount importance was resolved and the conceptual foundation for the ultrastructural analysis of biological water transport was laid. Peter Curran had made his first mark.

* * *

The double-membrane model combined simplicity with elegance. It rapidly received wide recognition and acclamation. Within two years of the "biological debut" of nonequilibrium thermodynamics, the power and utility of this conceptual framework was established. It was clear that definitions of active transport based on classical thermodynamics could not adequately distinguish between processes that are directly coupled to metabolic energy and those that may be directed against electrochemical potential differences by virtue of interactions with the flows of solvent or solute. Curran's work had assisted in the baptism of a new paradigm and terms such as "reflection coefficient", "coupling coefficient", etc., were rapidly incorporated into the "language of biological transport."

Pete Curran was captivated by the elegance and potential of this new discipline and by the charismatic genius, sparkle and wit of its chief proponent, Aharon Katchalsky. Together they wrote Nonequilibrium Thermodynamics in Biophysics (5) - a treatise that glows with logic and lucidity and which is destined to become a classic.

In particular, Curran was intrigued by the possible central roles of coupled interactions in biological transport. In a general sense, coupling is an expression of energy conversion; it is a means by which energy that is directly invested into the flow of one substance can become the motive force for other flows. The advantages to be gained in terms of the conservation of cellular energy supplies are obvious.

During the final ten years of his life, Curran's research efforts focused largely on the coupling between sodium transport and the transport of sugars and amino acids by mammalian small intestine. He was a firm believer in the notion that active sodium transport (or the consequences of the sodium transport mechanism) provides the energy for the uphill movements of sugars and amino acids via carrier-mediated co-transport. This belief is expressed explicitly in his paper entitled "Coupling between transport processes in intestine" (2) which was delivered in 1967 when he was honored for his accomplishments by being chosen the Twelfth Bowditch Lecturer of the American Physiological Society. Although this notion was (and is) challenged, the underlying theory was too attractive to be abandoned in the face of still questionable

and unsettled data. Although he will never know the final resolution of this important question, his contributions will have to be incorporated in any viable explanation.

* * *

Peter Curran was involved in a host of extramural activities that reflected his broad talents and the high esteem in which he was held by the scientific community. He was Section Editor for Gastrointestinal Physiology of the American Journal of Physiology and Journal of Applied Physiology (1968-1971), Chairman of the Publications Committee of the American Physiological Society (1971-74), and served on the editorial boards of the Biophysical Journal, Biochimica et Biophysica Acta, the Journal of General Physiology, and "Current Topics in Membranes and Transport." He was Council Member and President (1972-73) of the Society of General Physiologists and a Council Member of the Biophysical Society and the American Physiological Society. He served on the Molecular Biology Advisory Panel of the National Science Foundation, the Biological Sciences Training Committee of the USPHS and was Chairman of the Physiology Study Section of the National Institutes of Health (1974). At the time of his death, he was Professor of Physiology and Director of the Division of Biological Sciences at Yale University.

* * *

Peter F. Curran was a model of academic excellence, dedication and responsibility. His talent, insight and selfless energies will be sorely missed.

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A PETER F. CURRAN MEMORIAL FUND has been established at Yale University. Contributions should be addressed in the name of that fund in care of the Department of Physiology, Yale University School of Medicine, 333 Cedar Street, New Haven, Connecticut 06510.

EDITOR'S NOTE: Peter Curran gave unstintingly of his energies to the American Physiological Society. At the time of his death he was a member of Council, and in addition was Chairman of the Publications Committee. He had served on this committee for five years, and as its Chairman for three years, agreeing to complete his term as Chairman after election to Council upon urging by his fellow Councillors.

His service as member and Chairman of this important committee was during a most demanding period, seeing changes in the Society staff, major national economic problems requiring many decisions concerning publication finances, and considerations of the responsiveness of the Society's publications to the "scientific information explosion" and the new technologies of communication. All of these elements of change were superimposed on the demands of maintaining stable management and quality of the Society's six periodicals, the Handbook of Physiology, and other special publications.

That he performed these services to the Society in exemplary fashion, while maintaining a high level of personal scientific productivity underscores the loss we will experience in the future in being deprived of a member of such talent, ability and dedication.

COUNCIL ON EPIDEMIOLOGY AND PREVENTION
INTERNATIONAL SOCIETY OF CARDIOLOGY

The Council on Epidemiology and Prevention of the International Society of Cardiology announces its Eighth Ten Day International Teaching Seminar on Cardiovascular Epidemiology, to be held in Mexico, September 21 through October 3, 1975. Approximately 30 Fellows can be accepted. Final selection will be made by the Council's Seminar Committee. Nominees should be at the post-doctoral level, with some residency training or its equivalent, and be interested in cardiovascular epidemiology. Limited funds may be available to pay for room and board during the Seminar and to give partial assistance with travel costs for accepted Fellows. Fluency in English is an absolute essential.

Candidates are selected on an individual basis, and not as representatives of their institutions. Therefore once selection has been completed, should the candidate be unable to attend, no substitutes not reviewed by by the Seminar Committee may be sent as alternates by the institution.

Three documents are required for application: A letter of nomination submitted by chief of department or institution, a personal letter of application from the nominee, and the applicant's curriculum vitae. These should be received prior to the deadline for applications May 1, 1975. They should be sent to:

Jeremiah Stamler, M.D., Secretary
Council on Epidemiology and Prevention, I.S.C.
c/o Northwestern University Medical School
Ward Building - Room 9-105
303 East Chicago Avenue
Chicago, Illinois 60611

The Seminar is held under the auspices of the International Society of Cardiology and in association with the World Health Organization.

LATE REPLIES FROM SENIOR PHYSIOLOGISTS

Born in 1898

Paul Weiss to Hal Davis:

I have not at all "retired" and hope to be capable and allowed to keep working as long as fate and human environment will deign. This year alone I was reassured by receiving my fifth honorary degree, including the third one in medicine, and was elected to membership in the Max-Planck-Gesellschaft. The only trouble is that all this load of work is at variance with the more rational desires of both my wife and my medical advisers to start tapering off. Unfortunately, I feel that to make my experience available, is more responsible than revert to pleasures of youth through senile dementia. Well, we shall see.

Word has come of the death on October 16, 1974 of Rubert Anderson. He retired in 1968 after many successful years at the Army's Medical Laboratories at Edgewood, Maryland. He then enjoyed five years at Woods Hole before his final illness.

Hubertus Strughold, who retired in 1968 as chief scientist, USAF School of Aviation Medicine was honored in 1973 by the San Antonio chapter of the Daughters of the American Revolution. He received their Americanism medal for "contributions to the people of the United States."

Alex Hollaender to Bruce Dill:

Last January we moved to Washington, D. C. Our new address is 2540 Massachusetts Ave., N.W., Washington, D.C., 20008. My office is at the Associated Universities, Inc. (Brookhaven) at 1717 Massachusetts Ave., N.W., Washington, D.C. 20036, and I have recently hired a part-time secretary there. I am going to continue working out of my Oak Ridge office until the end of this year. My association with the laboratory and with the University of Tennessee will continue since I will be a consultant to both. The next Latin American symposium will be in Guatemala on the 25th anniversary of the INCAP. Dr. Nevin Scrimshaw of MIT is in charge, in association with Dr. Moises Gehar, the Director of INCAP. I am also working in close cooperation with the United Nations Protection Agency (UNEP) as a consultant. We are trying to establish a Registry of Potentially Toxic Chemicals, so I am staying quite busy.

Born in 1899

Edgar Poth reported to Maurice Visscher that he is involved in limited teaching, rounds and clinics, private practice of surgery and in conducting a regular research program.

Born in 1901

Irvine Page to Hy Mayerson:

How nice to hear from you and also to know that there are physiologists left interested in who is left, besides what. I continue to edit Modern Medicine while still living in Cleveland and Hyannisport. My medical life is more varied than ever before as I keep my connection with the Cleveland Clinic, and in order to write from small first-hand experience, put on a white coat to see a few patients. I am nothing like to the research division that I was a decade ago. The division now has a fine new building, which as everyone knows who knows me, indicates that I have just left for elsewhere. I am also editing the publications of the Coronary Club. The Club is doing well, especially since "Dear Abby" took out a membership and said so in her column. My work with the Institute of Medicine finished when I was retired at the first official meeting of the Institute. Nobody ever had shorter tenure. I must still be tough as my wife and I just got back from a trip to Japan to bring the word on hypertension and atherosclerosis to those who already know it. I have also helped organize the new Whitehead Research Institute at Duke University. I have published two books in the past two years, so in lieu of talking so much, I am writing. Tennis, jogging, anti-thrombogenic diet and a couple of Bourbons are still the order of the day.

Born in 1902

Charlie Winter wrote to Hy Mayerson: At the time of my retirement, I was Senior Investigator in the Merck Institute for Therapeutic Research. For the next two years, I taught in the department of pharmacology of Woman's Medical College, Philadelphia, on a one-semester basis. Merck then called me out of retirement to serve as Acting Director of Research at their newly acquired Laboratoires Chibret, in Clermont-Ferrand, France. They even sent me to Berlitz School to polish up my French! My main job was to work myself out of a job by hiring a Frenchman as permanent Director, a task which took a bit less than a year. During these three years, Merck also supported my participation in several international symposia. After my return from Europe, I was kept on as part-time consultant for another year or so, doing writing and other incidental chores. After these activities, my wife and I moved to Mercer Island, Washington, where two children and seven grandchildren also live. We are in commuting distance of the University of Washington, where I have a non-paying appointment in the department of pharmacology. I no longer do research, but give an occasional lecture or seminar and do a little writing. I also have the unique privilege of being a consultant and member of the Board of the International Foundation for the Study of Rat Genetics and Rodent Pest Control. This Foundation with headquarters in Oklahoma City, has a remarkable mutant rat strain; a single gene which renders the germinal epithelium of the adult male unresponsive to FSH, so the animal becomes sterile, though retaining a high degree of sexual activity. Females mated with such an animal become pseudo-pregnant. The Foundation hopes to test this as a biological means of rodent pest control, since the mated female refuses further matings, comparable to the highly successful sterile male technique for control of

certain insects. Preliminary trials indicate potential success, but research money is hard to get, and we have been unable to obtain the funds for large scale field trials to determine whether the potential will be fulfilled. Outside of these activities, I work hard in my large garden (in this climate, one can garden almost the year 'round), and take part in community affairs, such as the local Environmental Council. I am a firm believer in activity as well as mental stimulation.

James Irving to Hy:

I have been appointed a visiting lecturer in Oral Biology at Harvard School of Dental Medicine. In addition, have received a research grant from NIH for three years, so I am actually continuing scientific work. Also, I have just published a book entitled, "Calcium and Phosphorous Metabolism," Academic Press, and I am contributing a chapter to another book in this field. Apart from this, I am also organizing a seminar series for postdoctoral students, thus, you will see in answer to your questions, I am still very active and not interested in another position or in moving to another area. If you want any words of wisdom to pass on to these younger colleagues, that would be to get another post as soon as you can on retirement, and to keep active as long as possible.

Born in 1903

John Nickerson writes to Bruce:

I am still employed by the University of Health Sciences/The Chicago Medical School as Dean of the Graduate School. My position as chairman of the Department of Physiology was taken over by Dr. Vincent Glaviano, a graduate student of mine while I was at Columbia. Recently we have run into problems, precipitated by our contemplated move from Chicago to Downey, Illinois where we are affiliated with the VA Hospital and the Great Lakes Naval Hospital. One of the major problems which resulted was the unilateral withdrawal of our major hospital, Mount Sinai, from affiliation as of June 30, 1974. It was necessary for us to find clinical department chairmen, clerkships for our medical students, and certain facilities and teaching staff for our under-graduate technical programs. Many of the problems have already been resolved and others are on the way to solution. It has been a stressful period. However, we look forward to a move which should be accomplished by the middle of 1976, when we shall have a new campus and new facilities. It is certainly a fine opportunity for us to develop the University of Health Sciences. Because of considerable administrative duties involved in the development of the Graduate School, I have not been actively engaged in research. It is my hope that when retired as Dean of the Graduate School, I shall resume activity as a professor of physiology and involved again in some aspect of physiological research. I have been most fortunate to be able to remain active. I am sure the continuing activity, both intellectual and physical, has enabled me to ignore my birthdays.

Maurie Friedman wrote to Hy from Lausanne: I believe I had told you that the University of Lausanne went to Yale for their new professor of medicine - and chose Laurence Freedman. Moreover Larry and his

family have moved into this building one floor below us. The confusion is wonderful! During this past year we have made a number of short trips. First of all we drove to the French Riviera to take a four-week intensive course in French. It was exhausting, but probably well worthwhile, as evidenced by the fact that I can make the same mistakes as before, but much more rapidly. On the way home we stopped off in Montpelier to visit the oldest surviving medical school in Europe. You may recall that this school was started by three Spanish rabbis and two Arabs from Spain, all of whom had been invited by the King of France to come for this specific purpose. As you might expect of such learned rabbis, they had the medical school built adjoining the cathedral, so that both edifices could use a common court. The former Dean of the school took two hours or more to show us around and the highlight of the tour was our chance to view the astonishing collection of anatomical drawings - by all the great ones of all centuries, including Michelangelo, Leonardo da Vinci, and Raphael. In June we made a quickie to Bologna to join our daughter, Barbara, and her husband, who were in Italy for some meetings. While there we visited the medical school and saw their famous collection of anatomical models, dating from about 1700. Unfortunately, some of these had been damaged during World War II, but are now being carefully restored. I recommend this visit to any one coming to Italy. Moreover, Bologna is a beautiful and very interesting city. These two schools, like those all throughout Europe, have an enormous enrollment. The number of students at Montpelier was 6,000! The number in the school here in Lausanne is about the same. For diplomatic reasons, I shall not now comment on the quality of medical practice on the continent. TheAmerican people do not know when they are well off.

Sydney Harris to Hy:

My first year of retirement was filled with fascinating activity, and it seems to have passed very quickly. After the official retirement date, June 30, 1974, I remained in the office almost another month engaged in a variety of unfinished tasks for the department, and in the process of sorting, disposing of and packing collected items, mainly books, journals, reprints, slides and reference cards. I did not do my full share of the packing at home. Nancy bore the brunt of that big job although the furniture, chinaware, mirrors, paintings, etc. were delegated to the professionals. We spent the month of September touring and attending meetings in Europe. The tour began in Vienna and included Southern Austria, the Dalmatian Coast of Yugoslavia, Greece and Southern Italy. I presented a paper at the Sixth Annual Meeting of the International Study Group for Research in Cardiac Metabolism in Freiburg, West Germany, September 24-30. The subject of my paper (with collaborators A. J. Bocage and H. Otero) was Role of Sympathetic Excitation in Generating Arrhythmias in Early and Late Phases of Ectopic Responses Following Coronary Occlusion. The manuscripts are to be published in full by the University Park Press, Baltimore, Md. Excellent programs, both scientific and social were provided. The social activities included tours and dinners in the Black Forest and in neighboring Alsace, just across the Rhine river from Freiburg. These events were scheduled at times that did not conflict with the scientific sessions. Good food and good wine were plentiful. We are now at home in Carmel, California. Our house and

yard fulfill our desires and needs exactly. Carmel is a town on a hillside in the woods beside a beautiful seashore. It has a pleasant all year climate, beauty, friendly unhurried cultured people, music, ballet, theater, painting and all of the other fine art forms, including good food.

Yes, I am continuing scientific writing in collaboration with my LSU colleague, Dr. Albert J. Bocage. We still have manuscripts to finish and to work through publication. We also are now writing the terminal report on the NIH grant that has supported our research. I have the privilege of attending and participating in the weekly grand rounds conferences of the professional staff of the Community Hospital of the Monterey Peninsula. This is a truly superior hospital in its planning for patient care and in the quality of an environment that it provides both inside and outside the building. The clinical presentations and discussions show a thorough familiarity with the pertinent basic science concepts. I also have the privilege of using the hospital library. My membership on the Editorial Board of the American Heart Journal is continuing and is active. I might be interested in some consulting or other part-time employment if the home base could be maintained in Carmel. Some commuting and limited absences would be acceptable. I might be interested in a short-term administrative position to fulfill a special need if the conditions of the above could be met. We do not want to move away from Carmel. We have found our Utopia. Why leave it? My words of wisdom to younger colleagues are that lives will be made richer and happier by a diversity of knowledge and interests: history, literature, photography, travel, philosophy and the arts. It is best that such interests be cultivated from early childhood but it is never too late to begin. I view retirement as a relief from tensions and as an opportunity to live more fully, to do the things that have been postponed, such as sitting on a rock and watching the waves. I am glad to have news of your self-demotion to part time responsibility, and your interests in gardening and civic affairs.

Born in 1904

Hurley Motley to Bruce:

I am glad you are still going strong. I am still working in the Cardio-Respiratory Laboratory at the Hospital of the Good Samaritan. For the past eight years I have been working quite actively with the American Registry of Inhalation Therapists. The primary purpose is to upgrade respiratory therapy in hospitals. We now have over 2400 registered therapists in respiratory therapy in the United States. My health continues good. I enjoy living in Southern California in spite of the smog.

Born in 1905

Bill Foster to Hy:

Your recent letter arrived during my vacation, hence the delayed response. Today, I visited Dr. J. F. McClendon at a nursing home in Ambler, Pa. He is 94 years old, and somewhat incapacitated. His membership in the APS dates back to 1910, which makes me feel like a junior

senior physiologist. I will be 70 years old on my next birthday. Dr. McClendon appears to enjoy my visits to the nursing home. Cur friendship developed 40 years ago when I was a student. At that time there were very few Negro graduate students in physiology. Not long ago when Dr. Karl Beyer made his presidential address to FASEB he reminisced as a graduate student in 1937 when he attended the Spring Meeting at the Peabody Hotel in Memphis. I suppose the reason I recall this so vividly is that Negro graduate students were not welcome at this hotel at that time. I attended my first Spring Meeting in 1942 at Chicago. Not being able to obtain a reservation at a "loop" hotel, I stayed with friends on the "south side" and commuted to the loop each day. In Atlantic City, those few Negroes who attended the Spring Meetings years ago were unable to make reservations at a boardwalk hotel, and we stayed with friends. When the Spring Meeting of 1951 was held in Cleveland the Hollander Hotel accepted all reservations. My activities in the past 10 years have changed very little. I am Director of the Laboratory of Clinical Chemistry and the Stapeley Research Laboratory of Jeanes Hospital. My research has taken a more clinical slant as we have no animal facilities at Jeanes. I teach two days a week. This is my 17th year as a member of the department of physiology at the Medical School of the University of Pennsylvania. Before that I spent 18 years at Hahnemann Medical College in the department of physiology. I am a member of the Porter Development Committee of the APS. You will recall that the purpose of the Committee is to aid financially worthy Negro graduate students in the field of physiology. The funds are provided by the Harvard Apparatus Company. Dr. Clifford Barger heads this Committee and does an excellent job in stimulating Negro graduate students in physiology. I also serve as a member of the Study Section of NIH's Minority Schools Biomedical Support Program. Grants are awarded mainly to Negro undergraduate colleges and universities to bolster their biology and chemistry departments, and to stimulate undergraduate students. I attended my 45th class reunion at Brown University last June and the class seemed very enthusiastic about the 50th reunion in 1979. One might have thought that they were looking forward to their 20th reunion. Thanks for inviting me to write.

Ray Johnson to Hy:

I never seem to get completely caught up with desk and paper work, but a three-week delay in returning from my vacation this past summer (due to emergency surgery while in Ottawa, Canada) set me back farther than usual. Although I retired as Chairman of the department here in 1965, and as assistant dean in 1972, I am still active in the physiology teaching program and I am beginning my second year as Chairman of our Committee on Admissions. In addition to around 8500 applications annually for admission to our first year class, we have had for the past two or three years between three and four hundred applicants (mostly students in foreign medical schools) seeking transfer into our second or third year class. I am no longer doing any scientific research or writing, but I was co-author on two scientific publications that appeared last year. After another year, or at most two, I shall retire completely from academic life and spend my time traveling, reading, cleaning junk out of our basement and attic that has been accumulating for over 21 years,

working in the yard, walking, golfing, fishing, loafing, and doing a million and one other things that I have never found time for in the past. I am still in excellent health, but I have no desire to keep on working until it's too late to enjoy the pleasures and luxuries of retirement. Even though our children are all located in the East, both Mrs. Johnson (Teri) and I prefer to keep our retirement headquarters here in Omaha. Along with other senior physiologists, I have watched many changes take place over the years in our medical schools - changes in curriculum, in teaching methods and objectives, in student evaluation and selection, in faculty and student attitudes, and in many other facets of our medical school activities. Right now, with one of the major changes being a shift of emphasis to the clinical aspects of teaching, with earlier introduction of clinical instruction in the curriculum, my advice to young physiologists would be to establish a close working relationship, in both teaching and research, with clinical members of their staff. Many young clinicians are emphasizing in their teaching basic physiologic concepts that underlie the changes seen in disease, and it stands to reason that the overall program of instruction would be strengthened and made more effective if physiologists and clinicians shared their expertise in a unified, cooperative teaching effort.

Born in 1906

Austin Brues to Bruce:

I have been "retired" for three and a half years from the Argonne Division of Biological and Medical Research, of which I was formerly Director, also engaged in physiological and pathological research. After two months' retirement, I came back to the Division of Radiological and Environmental Research where I bear the title of Medical Director of the Center for Human Radiobiology. Most of this job consists of a medical and epidemiological study of persons contaminated with radium - several thousand throughout the country. A fair share of this is intelligence work, i.e. locating people, many of them dial painters known long ago by a maiden name. Nowadays, bone tumors are appearing less frequently but mastoid carcinomas are overtaking them, although they arise from a few cm^2 of lining epithelium. I would like to correspond with anybody who is familiar with the physiology of this area or who knows of a good animal model for the mastoid cavity. I keep pretty busy and travel a good deal. My advice to younger colleagues is to keep broad interests. I suspect this comes more naturally to physiologists than it does to a lot of people.

Born in 1908

Leslie Bennett to Hy:

I am back in the Chancellor's Office of the San Francisco campus. Between July, 1971 and July, 1973, I returned to being a full-time professor, had a sabbatical leave in residence, and established to my own satisfaction that I could still relate to freshmen medical students and could still do laboratory research. I am pleased to say that even back full-time in the Chancellor's Office I manage to continue a small part-

time collaboration with one of my former graduate students and continue a long-time interest in control of insulin secretion by the isolated perfused pancreas. Four publications have resulted from this collaboration in the last year and three more are in press, submitted, or in preparation. One of the great pleasures I had in the two years I was out of the Chancellor's Office was to spend a great deal of time looking into the life and work of my Professor, Herbert M. Evans. I am pleased that I was able to write a chapter devoted to his life and his place in Endocrinology which will appear in Volume III of Hormonal Proteins and Peptides, edited by C. H. Li and published by the Academic Press.

Born in 1909

Louis Toth to Hy:

Many thanks to you and the Committee for remembering us old physiologists. Compulsory retirement here at LSU Medical Center is 70, so I have not given any thought to what I shall do after I reach that age. At present, I am kept busy with a heavy teaching load with dental and allied health professions students. Also, I was appointed Athletic Coordinator of the Medical Center three years ago after supervising the athletic program unofficially since 1946. I take pride in having nurtured the program from a softball league (which our Faculty Team won 15 years ago before I retired as an active player) to an all-year program of major and minor sports. But being a one-man athletic department, lacking even secretarial help, is a time-consuming job. But I enjoy it. I am no longer at the Medical School. When John Spitzer was appointed Chairman he wanted all of his own people to be under the same roof - so he moved Churney and me (the two oldest members of the Department) out to the Dental School Campus. We have a new building out here but our offices are in an old barracks building. I wonder if he wants us to retire before we reach 70? Be as it may, we are out here, away from the hectic traffic of Tulane Avenue.

Replies to Birthday Greetings

Bob Kehoe's reply to the birthday greeting from Bruce demonstrated the determination exhibited by many physiologists to rise above adversity and physical handicaps:

It was good of you to write to me in relation to my 81st birthday, and in return I'll be glad to tell you something of myself and my affairs. I am a retired Emeritus Professor, who founded the Kettering Laboratory and is the principal influence in this institution and, to some extent, in the American community in the field of Occupational Health, in particular relationship to the technical, industrial segment of our national life. During the last 10 or 15 years of my headship of this Department (which at that time was the Department of Industrial Health and Preventive Medicine, and is now the Department of Environmental Health, with an excellent Director, who is a Dermatologist and a good one, Raymond R. Suskind, M.D.), I was very busy with the affairs of a large department, and while I kept some well-organized experiments going (with the help of a number of highly competent people), I was unable to study the data (time) of the experiments and to put them together for publication. Incidentally,

this is being done now, but since I am terribly handicapped by near blindness (cataracts plus retinal changes), the real work has to be done by a younger assistant with advice from me from time to time. I also had a stroke, involving only the brain stem without paralysis, some time ago, and I have to overcome that handicap, very disabling to my memory. I have nearly recovered from the stroke, but the ocular problem will continue until I have my cataracts operated on and the retinal changes cease to progress (I should say "if they cease"). As a medical man, you will be interested to know that my stroke occurred without any evidence of general vascular disease, with specific reference to blood pressure alterations.

Well, we shall see whether or not I can return from limbo, but I have reached a good old age with still some energy, and I hope to use it to my own advantage and perhaps to certain other people. My wife, Lucile, seems to have no doubt about this, and she, indeed, has been and is a great source of strength to me. We have one daughter, no longer a child, now living in England and a very busy person, unmarried. It is too bad in one sense that she is so far away, but considering her own career and independence, it is good. I have had, as you probably know, a very satisfactory professional acquaintance in London and elsewhere in Britain, and therefore, Kathleen seems not at all to be among strangers.

I'm afraid this does not tell you much about me and my family and my work, but you will know that I am still at it, in some degree, however limited it may be. I am still improving physically, despite my age and certain disabilities and believe it or not, I still have hope of getting back into effective work.

Lester Dragstedt wrote to Maurice in reply to birthday greetings:

Thank you for your fine letter of October 1 last and, more especially, for the kind and generous spirit that prompted you to take the trouble to write it. I appreciate it very much indeed and will cherish this letter among my treasures. I congratulate you also for the same type of service for medicine and physiology, and I'm sure that I speak for our old friend, Dr. A. J. Carlson, who would say about you, "Good work!" I have finally succeeded after many years of failure to prepare a dog with two Pavlov pouches. I have wanted this for so long in order to study the afferent fibers in the vagi and their possible effect on gastric secretion. I am still young enough to be excited!

Word has come of the death on July 19, 1974 of Henry Laurens, born October 15, 1885. A pioneer in radiation effects, he was author of "Physiological Effects of Radiation," American Chemical Society Monograph No. 62, 1933.

More Late Replies from Senior Physiologists

Mrs. Jesse McClendon wrote Maurice that Jesse at age 94 can no longer see well enough to write. He receives excellent care in a nursing home where his wife and friends are able to visit him.

Edward Larson after a year's failing health died October 5, 1974. Readers of The Physiologist will recall that many of his letters are on record.

In a delayed reply to our biennial inquiry Paul Sturkie wrote Bruce of reorganization at Rutgers.

Physiology at Rutgers is organized into three departments, 1) Liberal Arts, Rutgers with five faculty members with Harry Frankel as chairman. Dr. Green, former chairman, is now serving as acting dean of the graduate school. 2) Rutgers Medical School is now actually New Jersey College of Medicine at Rutgers. It was taken over by former Governor Cahill and it has its own president, etc., although the physiology group at the medical school still participate in our Graduate Physiology Program (one for all campuses). I believe Rutgers Medical School now has six faculty with Robert Crane as Chairman. The College of Agriculture has disappeared as such and is replaced by Cook College, a multipurpose college whose theme is "Man and his Environment." Shortly before this was effected, I started a new department of Environmental Physiology (1971) made up of three physiologists who were formerly in the department of Animal Sciences. Cook College is growing rapidly in undergraduate enrollment. My department teaches all of the undergraduate Physiology for Cook College and also Douglass (Womens College). We offer courses in Environmental Physiology, Exercise Physiology (for Douglass Physical Education students), Stress Physiology and graduate courses in Cardiovascular Physiology, Environmental Physiology and Avian Physiology.

I would like to retire in about 1-2 years, but seem to be too busy now to do so. We can stay on here until age 70, however our president would like us to retire sooner. I am revising my book "Avian Physiology" (3rd edition) and will get it to the publisher (Springer-Verlag) by February 1, 1975, if my last contributor is on time. I will be interested in a part-time job (teaching and writing) within another year or so, and I have not as yet made a final decision on retirement. But I shall be free to move when the time comes.

John Bateman wrote Hal about his activities in Europe.

When reading with interest, and sometimes with admiration, the messages from "Senior Physiologists" I have realized that my time would come. When it did come it had something of the impact of a draft call and an unwelcome reminder of things that one might prefer to ignore. You were kind enough to ask where I am and what I am doing. I was fortunate enough to be appointed in 1969 to a position as Chief, Life Sciences Branch - a one-man branch, I hasten to add - with the European Research Office of the U.S. Army. I thus escaped the

Fort Detrick debacle which left many of my colleagues to face unemployment or at best reemployment in often inferior positions. The European Research Office in that year was still in Frankfurt. I spent a few pleasant months there awaiting transfer to London, where we are now housed in the same building as the Office of Naval Research (London) and the European Office of Aerospace Research.

The position at ERO has been in many ways a very satisfactory one. One has had to give up any pretense of continuing actively in one's former specialties, but the occasional feeling of deprivation is dispelled by contact with current research in many exciting fields of biology and medicine and by the experience of being cordially received in laboratories and hospitals all over Europe and the Near East. Not least is the satisfaction of having left behind all contact with classified information and of being able to work openly in the setting up of contacts (and sometimes contracts) between European scientists and their colleagues in U. S. Army laboratories. I am not, you will gather, among those who find Army activities overseas necessarily tainted with ulterior motives - or, rather more to the point, I do not care if they are, as long as I can approve of the outcome of my own efforts. In this, one is singularly fortunate in being in the Life Sciences, for in this area I think that "basic," but directed, research aimed toward amelioration of the soldier's lot is likely to be of equal benefit to people in general. There are obviously other sciences and technologies for which this is not true.

Recently my tour of duty was extended until 1977. Recent reorganizations place completion of this tour in jeopardy. The non-medical life sciences have been radically downgraded with the destruction of the Pioneering Research Laboratory at Natick, the dissolution of the Biological Laboratories at Fort Detrick and a general deterioration at Edgewood. It is likely that all overseas activities in the Life Sciences will be "phased out," as they say, but I do not know when or how.

Personally I hope to remain in London, and to retire from the U. S. Civil Service only whenever it becomes necessary to do so. This is evidently a good time to respond to the questions in your letter and to assert my need for continued employment and my availability for work which could be conducted from here. The possibility of periodic visits to the States, even for a substantial part of each year, would of course be entertained. As for the kind of work for which I feel myself qualified, it would fall into the general area of scientific liasion and information exchange. One would like to be associated with projects for assisting European scientists to find temporary accommodation for specialized cooperative research projects in U. S. Laboratories; with formulation of technical programs for interdisciplinary and international discussion meetings and study groups. I would be happy to report current overseas research on particular topics, something that might well include a certain amount of translation from French and German of outstanding works for which an English version is clearly needed. Perhaps too there might emerge opportunities for cooperation with book publishers dealing with manuscripts from European sources. There are in addition miscellaneous literary projects of my own which are still taking shape but are most unlikely to prove lucrative. Finally the possibility of some part-

time experimental research in a laboratory in the London area would be attractive, no doubt more as a luxury than as a means of earning a livelihood.

Those are the bread-and-butter matters about which you ask. I do not like the term "full-time," and certainly I hope to squeeze my quasi-scientific efforts into something less than twenty-four hours a day so as to be able to give more of my time than hitherto to music, which has always engaged as much of my attention as I could spare. My home in London is ideal for the purpose. There are always friends with whom one can work up chamber music of a two-piano program and, I am glad to say, friends who are willing to come and listen once we have decided that a respectable performance is possible. There are of course innumerable musical societies and amateur orchestras in and around London. One of my favorites is the Oxford and Cambridge Music Club which recently celebrated its seventy-fifth anniversary and offered its 1346th concert. A position on the Club committee gives me welcome involvement in its affairs and the opportunity to meet, and often to perform with, its members.

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AJP - VOLUMES 192-221

The Society received notice from Dr. Charles M. Campbell that the U. S. Sheep Experiment Station has Volumes 192-221 of the American Journal of Physiology which they would give to a new library. An institution desiring these volumes should contact:

United States Department of Agriculture
Agricultural Research Service
Western Region
U. S. Sheep Experiment Station
Dubois, Idaho 83423

THE JOHANANOFF INTERNATIONAL FELLCWSHIP FOR ADVANCED BIOMEDICAL STUDIES

The Mario Negri Institute for Pharmacological Research of Milan, Italy, and the Mario Negri Institute Foundation of New York City, USA, announce the establishment of "the Johananoff International Fellowship for Advanced Biomedical Studies," through the generosity of Mr. S. Johananoff, a distinguished international industrialist. The purpose of the Johananoff Fellowship is to offer an internationally known scientist the opportunity of spending his sabbatical year at the Mario Negri Institute for Pharmacological Research in Milan. His task will be to evaluate and integrate the knowledge available on a specific subject, within the research areas of the Institute, to produce a comprehensive review, representing a constructive synthesis of the chosen subject. The grantee, to be named "the Johananoff Fellow" will present his work at the end of the year through a public conference, called "the Johananoff Lecture." The lecture and the review will be published. The candidates should be non-Italian citizens, known for outstanding contributions in cancer chemotherapy, cardiovascular pharmacology, neuropsychopharmacology, drug metabolism. Cnly candidates from academic or non-profit organizations will be considered, willing to spend their sabbatical year in Milan. Applications for the academic year 1975-73 should be submitted by April lst, 1975 and should include curriculum vitae, publications and outline of the proposed studies. The amount of the fellowship is $15,000.

The Johananoff Fellowship Committee
Instituto di Recherche Farmacologiche "Mario Negri"
20157 Milano, Italy

2nd INTERNATIONAL SYMPOSIUM ON VASCULAR NEUROEFFECTOR MECHANISMS

The 2nd International Symposium on Vascular Neuroeffector Mechanisms will be held in Odense University, Denmark, July 29th to August 1, 1975. The following topics will be included: Morphology, Development and Differentiation of Blood Vessels; Mechanisms of Neural Control of Vascular Tone; Ionic and Metabolic Control of Vascular Muscle; Pathophysiology of Vascular Disease and Clinical Aspects.

This is a satellite symposium of the 6th International Congress on Pharmacology, Helsinki 1975. The Organizing Committee includes John A. Bevan, M.D., University of California at Los Angeles, Borje Johansson, M.D., University of Lund, Robert A. Maxwell, Ph.D., The Wellcome Research Laboratories, North Carolina, and Ove A. Nedergaard, Ph.D., University of Odense.

For further details please write to: O. A. Nedergaard, Ph.D., Institute of Pharmacology, University of Odense, Niels Bohrs Alle, DK-5000 Odense, Denmark.

INTERNATIONAL CONGRESS OF PATHOLOGICAL PHYSIOLOGY

The International Congress of Pathological Physiology will be held in Prague from July 8-11, 1975. The program will concern mainly the general conception of clinical and pathological physiology and the teaching of this discipline in various countries. Specific problems are to concern the regulation mechanisms of metabolism, erythropoiesis, respiration, the nervous system and the cardiovascular system.

The deadline date for participation in the program is March 1, 1975. For further information please contact: Doc. Dr. F. Paleček, CSc, Scientific Secretary of the Congress, Ke Karlovu 2, 121 09 Praha 2, Czechoslovakia.

NINTH MILES INTERNATIONAL SYMPOSIUM

Cell Membrane Receptors for Viruses, Antigens and Antibodies, Polypeptide Hormones and Small Molecules

This Symposium will be held at The Johns Hopkins Medical Institutions, Baltimore, Maryland, June 4-6, 1975 and will address the identification and role of cellular receptor sites to a variety of biologically active entities, including viruses, antigens and antibodies, polypeptide hormones and small molecules. The participation of these interacting systems in immunological, endocrinological and pharmacological phenomena within the cells has become a subject of increasing interest and importance in biomedical research during the past ten years. The Symposium Chairman will be Roland F. Beers, Jr., M.D., Ph.D., Miles Laboratories, Inc. Program Committee Members will be: Purnell W. Choppin, M.D., The Rockefeller University; Martin C. Raff, Ph.D., University College London; Martin Rodbell, Ph.D., National Institutes of Health; and Jesse Roth, M.D., National Institutes of Health.

For further information, contact: Edward G. Bassett, Ph.D., Symposium Coordinator, Miles Laboratories, Inc., Elkhart, In. 46514.

INTERNATIONAL NEUROLOGIC SYMPOSIUM

The Institute for Continuing Education is conducting an International Neurologic Symposium in cooperation with the University of Miami School of Medicine. The Symposium will be held in Israel on November 6-19, 1975. For further information contact:

The Institute for Continuing Education
P. O. Box 11083
The Malvern Building
2405 Westwood Avenue
Richmond, VA 23230

MAJOR NEW CONFERENCE ON BIO-MEDICAL ENGINEERING

The University of Chicago Center for Continuing Education is presenting an important new conference entitled "The First National Bio-Medical Engineering Conference," on Tuesday and Wednesday, May 6-7, 1975 at the Center for Continuing Education in Chicago, Illinois. The conference will comprehensively cover the major technological breakthroughs in this rapidly changing field, ranging from advanced developments in biomedical instrumentation to the latest developments in surgical implants and mechanical organs.

An array of the country's top medical and technical experts will address the conference. Among the experts making presentations are Dr. Robert Sparkes, Dept. of Biochemistry, Washington University, St. Louis, Mo.; Dr. Robert Weinman, National Institute of Arthritis, Metabolism & Digestive Diseases, Bethesda, Md.; Dr. John Lontz, VA Administration Center, Wilmington, Del.; Mr. W. F. Mathewson, Manager of Pacemaker Products, G.E. Medical Systems Division, Milwaukee, Wis.; Dr. Lewyllis Barker, Director-Division of Blood & Blood Products, FDA, Bethesda, Md.; and Dr. F. Ray Finley, Krusen Center for Research & Engineering, Philadelphia, Pa.

MEASUREMENTS, MODELS AND NOISE IN ENDOCRINE AND METABOLIC SYSTEMS: A SYMPOSIUM SUMMARY

Measurements, Models and Noise in Endocrine and Metabolic Systems: A Symposium Summary, by Diana M. Schneider, Ph.D. (MIT) with an introduction and concluding remarks by F. Eugene Yates, M.D. (University of Southern California) is available without charge from The Kroc Foundation, Department MM, 216 E. Cota Street, Santa Barbara, Calif. 93102. The sections of the 24 page report are: The Conceptual Basis of the Modeling Approach; The Use of Systems Theory and Mathematical Concepts; Modeling Endocrine Systems; and Modeling Metabolic Processes.

TWELFTH ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM

The Twelfth Annual Rocky Mountain Bioengineering Symposium will be held at the University of Colorado Medical Center, Denver, Colorado, April 28-30, 1975. Papers are solicited for the Program of the 12th RMBS. Papers may be on any aspect of Bioengineering. It is expected that sessions will include but not be limited to the following topics: Health Care Delivery; Instrumentation; Prostheses; Pattern Recognition; Computers and Patient Monitoring; Grounding and Patient Safety; Ecological Applications; Biomedical Systems Analysis.

For further information contact: Mr. K. C. Rock, Director of Bioengineering, University of Colorado Medical Center, 4200 E. 9th Avenue, #2335, Denver, Colorado 80220.

1974 TOXIC SUBSTANCES LIST AVAILABLE

The 1974 Edition of the Toxic Substances List (HEW-NIOSH-74-134) is now available. This third revision contains listings of 42,000 chemical substances including 13,000 entries with qualifying toxic dose information and 29,000 synonymous names and codes. The 1974 edition contains approximately 5,000 new chemical compounds identified since publication of the 1973 edition. The compilation provides ready reference to potential toxicity of chemicals found in the workplace and should be a useful source document for occupational health workers, biomedical researchers, teachers, and students. Copies are available from the Government Printing Office (GPO-1733-00035) at $8.40 each.

INTERNATIONAL PLENARY SESSION ON FOOD-MAN-SOCIETY

The third meeting of the International Crganization for the Study of Human Development will be held in Madrid, Spain, September 22-24, 1975. The program will include the history of food production; ethical and philosophical considerations of food; the associated geographical, economical and sociological implications; food and health; the availability of food; and various aspects of teaching and research relating food to the human developmental process. Non-members are cordially invited. Registration fee - $50.00 by June 30, 1975, please. A limited number of free papers will be selected - 250 word abstract by June 1. Address all correspondence to the Executive Secretary, Dr. D. N. Walcher, Human Development Building, University Park, Pennsylvania 16802.

INTERNATIONAL SYMPOSIUM ON THE MITRAL VALVE

The International Symposium on the Mitral Valve, Physiology, Blood Flowmetry, Ultrasonic Diagnosis and Surgery, sponsored by the French Cardiac Society, will be held May 26-28, 1975 at the Hotel PLM Saint-Jacques, Paris, France.

Inquiries regarding the Symposium should be addressed to: Dr. D. Kalmanson, Program Director, Dept. of Cardiology, Fondation A. de Rothschild, 29 rue Manin, 75019, Paris, France.