THE AMERICAN PHYSIOLOGICAL SOCIETY

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Orr E. Reynolds, Editor

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PAST-PRESIDENT'S ADDRESS

IS THE DODO BIRD *REALLY* EXTINCT?

EWALD E. SELKURT

I. INTRODUCTION

It is a privilege and pleasure to address you tonight in the role of Past-President of our society. A part of the pleasure frankly arises from the fact that the more active duties of the presidency lie behind me, in the capable hands of Dr. W. Francis Ganong, and the incumbent members of Council. In particular, I wish to thank Dr. Orr Reynolds, our Executive Secretary, and his efficient staff, for the support and assistance given me during the past year.

I shall digress a moment to remind those in attendance this fall at Hollywood Beach, Florida, that they are participating in an experiment – an experiment in program planning. For this is the second of the "big city - resort area" type of meeting, held in October instead of late summer at university campuses. The one in San Francisco in the fall of 1975, you will recall, was the first of such, the so-called "big city" variety. I trust that business and pleasure have been combined at this resort area for a pleasant admixture on this particular occasion (Fig. 1).

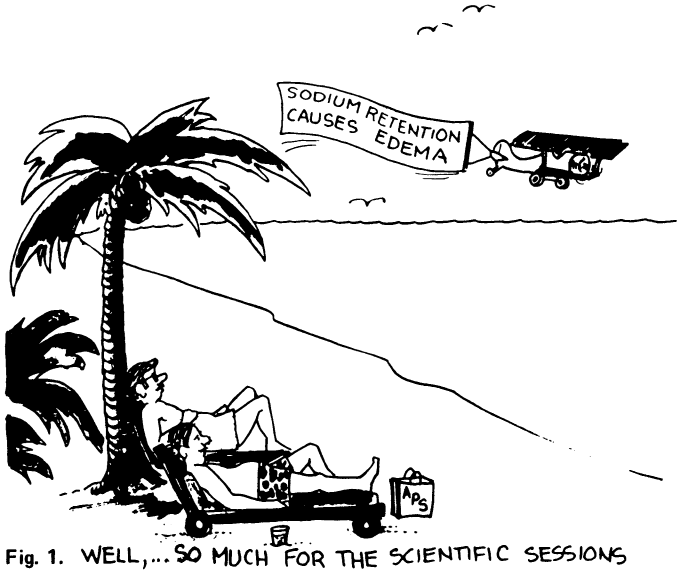


Fig. 1. WELL,... SO MUCH FOR THE SCIENTIFIC SESSIONS

As has become customary in the now venerable tradition of the Past-President's Address, I will develop some of my thoughts about the more recent past, the present, and a bit of the future role of physiology, physiologists, and the American Physiological Society, in the teaching and research aspects of our discipline. Reviewing the presentations of some 19 former Past-Presidents (since the inception of "The Physiologist" in 1957) disclosed a wide coverage of topics over a considerable time-span. For example, Dr. Hyman S. Mayerson went back 75 years in his talk, "Physiology and Physiologists in the Gay Nineties" given in November, 1963 (15). Dr. Robert F. Pitts, in 1960 (16), Dr. John M. Brookhart in 1961 (4), Dr. Robert E. Forster in 1967 (11), and Dr. Daniel C. Tostesen in 1974 (18), boldly looked into the future. Although the policy of trying to plan for the future is admirable, recent events have proven that it possesses the vagaries of a roulette wheel at Las Vegas. It is, of course, easier to look back and see where, when, and how we made our positive achievements and our mistakes, and try on this basis to prepare for future developments (Fig. 2).

"Today's problems should have been solved in the 1950s, but in the 50s we were solving the problems of the 20s, in the 20s we were solving the problems of the 1890s . . ."

Fig. 2. Reprinted with permission of Sidney Harris, Great Neck, N.Y. from *American Scientist,* 63:695, 1975.

This leads me in the direction of explaining the title of this talk. On July 19, my office telephone rang for a call from Bethesda. It was Orr Reynolds, requesting the prospective title of my talk, so that it could be printed in this fall's program. I explained to him that I was in the process of reading background material, relaxing in the luxury of having yet almost three months to get ready; and that I usually chose the title last, *after* having written the paper. His reply was succinct: "I'll give you until next Friday to send me a title – a *catchy* one".

So I worried about "catchy" titles over the week-end, and finally came up with: "Is the Dodo Bird *Really* Extinct?" Orr liked this. Then I began to write my lecture, manifesting immediately a trace of "Dodoism"* in this reversal of the usual procedure, for I was writing my presentation to suit the title.

Now let me define terms, and meander a bit into the field of my college major, Zoology. The informal application of the term *dodo* or *dodo bird* is: "one who is slow to respond to new developments, as from dullness or senility" (Readers Digest Great Encyclopedic Dictionary); "A person who is simple mindedly unaware of changing conditions and new

*A coined word, meaning: being or acting like a dodo bird.

ideas". (Webster's Unabridged Dictionary); or perhaps somewhat more politely, "one who is hopelessly behind the times" (Webster's Collegiate Dictionary). Briefly stated, it implies *conservatism.* The term could not only be applied to individuals, but to groups or organizations. The etymology of the word stems from the Portuguese and French word, *doudo* (which actually means silly or stupid). This supposedly extinct bird, presumably last seen in 1681, lived on the islands of Mauritius and Réunion in the Indian Ocean. It was about the size of a turkey, and equally good eating, accounting for its threatened existence.

Here is a picture of the dodo bird (Fig. 3). Note the vestigial wings, too small and weak to allow this heavy bird to fly, thereby making it easy prey to the hunters of the time. Perhaps you are thinking even now that the dodo bird is really not extinct, in the light of this photographic evidence! We shall see.

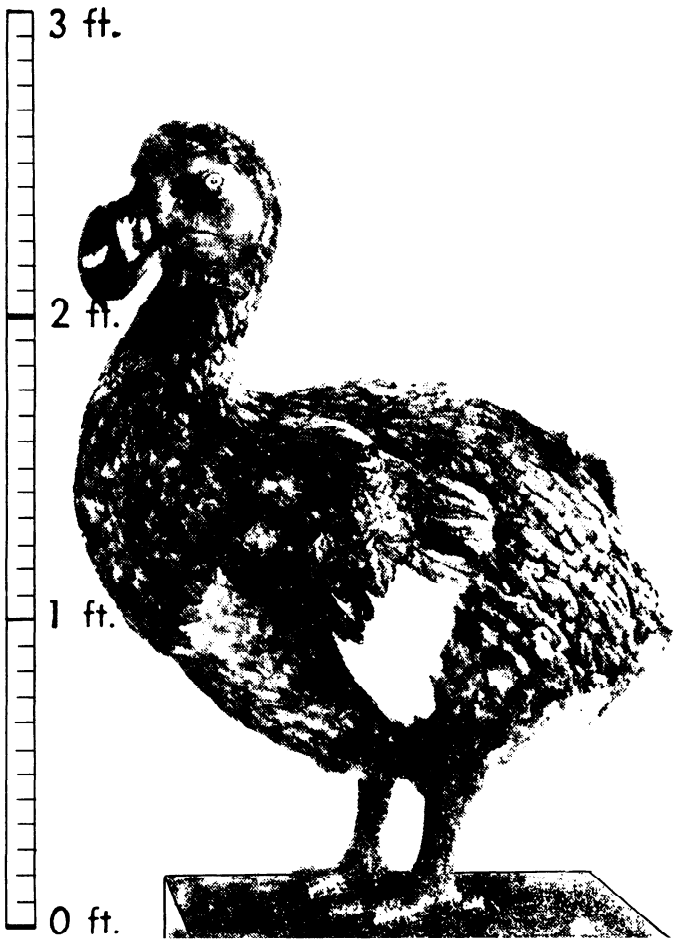


Fig. 3. Courtesy of the American Museum of Natural History.

The dodo, *Didus ineptus,* should not be confused with the penguin, a flightless aquatic bird of Antarctica. As any eighth grader knows, this vestigial-winged bird belongs to the family *Spheniscidae.* The penguin has remained viable and well by adapting effectively to its rigorous environment (Fig. 4).

II. THE PROBLEM

Now to the more serious matters concerned with the theme of this presentation. I intend to develop the thesis that we, as scientists and, more specifically, as biologists and physiologists, were thrown rather abruptly in the mid-50's and early 60's into a hectic upheaval created by the rapid expansion of medical teaching and research which occurred then. Were we ready, and did we meet the challenge? Or did we display the instincts of the dodo bird: slow response to new developments — hopelessly behind the times? I believe we did meet the challenge successfully, only to be left, so to speak, high and dry by the current attitude of the Federal government toward medical education and biomedical research, viz., that too many doctors and new faculty are now being produced. This has been accompanied by the leveling off of research support, the growth of directed research at the expense of investigator-initiated research, the impact of large research institutes on the academic fabric, regulative intrusion on the conduct of research, and the winding down of research training grants.

"I GUESS YOU COULDN'T CALL GOOD OLD HERMAN A DODO BIRD."

Fig. 4. Reprinted with permission of Sidney Harris, Great Neck, N.Y. from *American Scientist,* 59:83, 1971.

Presently, the future looks uncertain, the horizon hazy. In which direction will we turn? Should we take the advice of Past-President John R. Brobeck, who recommended in his address of 1972 (3), in essence, that we plunge ahead? To quote:

> "We can, and we should, flood the heather with physiologists eager to take part in all of the new proposals and experiments in medical education, and in the creation of a new "system" for delivery of health care, as well as in the search for fundamental new knowledge that physicians must have to conquer the most important clinical problems. Instead of being suspicious of what is taking place in medical education and health care, we should join in eagerly, ready to assume responsibility and to provide leadership in changes that must come."

Or shall we stand pat, hold onto our gains, and wait for the future to unfold? Dr. Robert F. Pitts, in accepting the first award for contributions to teaching of Physiology, presented by the ACDP (Association of Chairmen of Departments of Physiology) in 1972 (17)), predicted, to quote:

> "The situation will worsen over the next few years, but in time there will come another Flexner Report. My advice is to salvage as much as possible and save it for the day of renaissance."

We should, I believe, consider exploring in both directions, both ends of the spectrum, as it were.

This is reminiscent of an anecdote:

> A blind man, led by a seeing eye dog, was observed to be pulled across an intersection against the busy traffic. Miraculously, he was not hit. He then proceeded to hand the dog a biscuit to eat.
>
> A near-by spectator asked, in surprise: "Why do you

reward the dog with a biscuit, when he almost had you killed?"

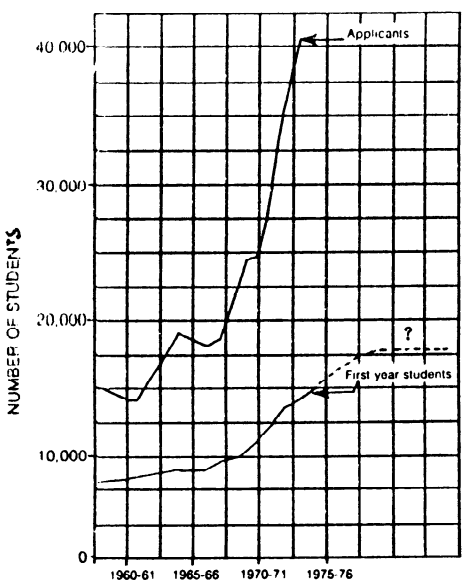
The blind man replied: "I was feeling for his front end, so I could kick his behind".

Thus, we need orientation for the future. But perhaps we can get our compass-bearings from the past.

To go on: I contend that Bob Pitt's postulation puts a favorable light on Dodoism, in that conservatism (but with positive reaction) could complete the cycle of change. If not Flexnerism, some other, new and stable base should be established, from which our discipline can, indeed, move ahead securely into the 80's. We will accept all that was good in the phase of transition (e.g., capitalizing on the emergence of new disciplines in our Society, new and sometimes better methods of teaching, etc.). And oppose, if not reject entirely, among others, core curricula and the shortening of teaching time, abandonment of solid laboratory teaching, the threat to move the pre-clinical sciences into the pre-medical curriculum, the possible invasion and take-over by clinicians, and so on.

III. THE PERIOD OF FERMENT

In proceeding, it is now my intent to examine more closely some aspects of the exciting epoch of biomedical development, in the period from approximately 1960 through 1975 (with some spill-over at either end). This has been called a phase of "ferment in education" by Pitts (16). Dr. R. M. Magraw, in his study of medical practice and its new dilemmas, has entitled his book published in 1966, *Ferment in Medicine* (14). Some important features of this era were: the rapid increase, with governmental urging and support, in the number of medical schools, from 80 in 1960 to 118 today. This was accompanied by marked increases in numbers of entering medical students, and an even greater increase in number of applicants (Fig. 5) (1). This has slowed down now, with the recent federal government opinion that we are now producing too many physicians, resulting in cut-backs in capitation and student financial assistance.



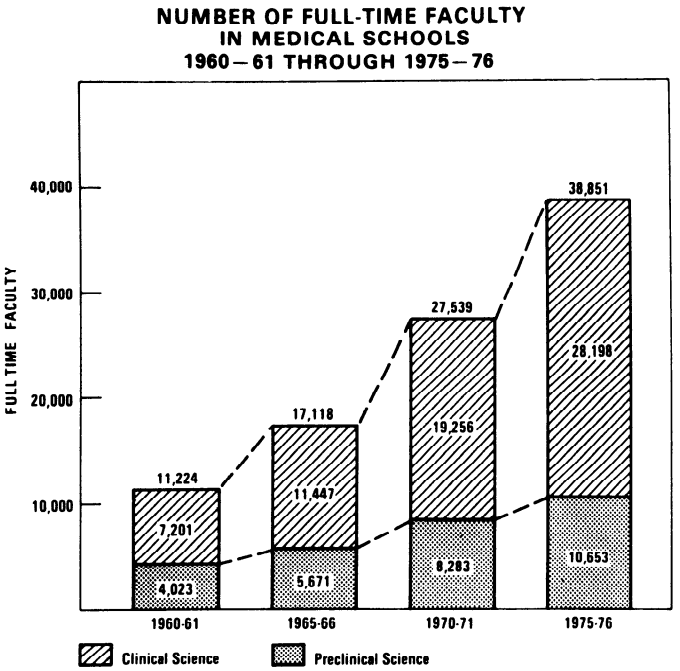
Applicants and Entrants to U.S. Medical Schools, 1960-1974. (J.A.D. Cooper, 1976, and Carnegie Council Projection (dashed line)).

Fig. 5. Printed with permission from: *Medical Education: Institutions, Characteristics and Programs — A Background Paper,* Association of American Medical Colleges, Washington, D.C., June 1977.

Data comparing Physiology graduate student enrollment in more recent years (1972 through 1976, ACDP survey) show 767 in 1972, stablilizing at about 1050 to 1100 in 1974, 1975 and 1976 (85 schools reporting). A total of 152 Ph.D. degrees were granted in physiology in 1976. Faculty positions available at the instructor and assistant professor level at this time totalled only 43. Clearly, over a hundred new Ph.D.'s needed to compete for post-doctoral posts, find jobs outside of academic departments, or not be employed in their discipline.

Full-time Basic Science faculty size increased (1) (Fig. 6) from 4,023 (1960-61) to 10,653 (1975-76), a 165% increase. Physiology faculty size has leveled off at about 1,530 in 1974, 1975 and 1976 (estimated at 14.4% of total Basic Science faculty size in 1976).

Clinical Science faculty has increased from 7,200 (1960-61) to 28,200 (1975-76) (1), a 292% increase (1).



SOURCE: LCME Annual Questionnaire, Part 2.

Fig. 6. Printed with permission from: *Medical Education: Institutions, Characteristics and Programs — A Background Paper,* Association of American Medical Colleges, Washington, D.C., June 1977.

Regrettably, Biomedical Research funding, after rising precipitously from 1955 to 1965 fell off, as a percentage of total national health expenditures, during the period 1965 to 1975 (6) (Fig. 7). Current trends suggest that it will fall further. Total National Health Expenditures rose continuously from approximately 39 billion in 1965 to over 122 billion in 1975, almost a 3 fold increase. National Biomedical Research meanwhile rose also, but not at the same rate (1.9 billion to 4.6 billion) so that percent of the total fell from 4.8 to 3.8% (6). (None of these figures is corrected for inflationary trends.)

Now, that should pretty much take care of the statistical data for this evening, and please accept my apologies for throwing so many figures at you. But it was necessary to document several of the important trends that occurred during this span of "ferment", and to note that we are today poised on the edge of a precipice, not knowing what might lie ahead. Some other trends during this period will be considered later.

In the light of the fore-going data, will our presently hypothetical model, the dodo bird, in an evolutionary manner

develop stronger wings, and survive? Will he develop a substitute for lack of wings, as did our ingenious penguin, Herman, shown earlier? Or will he, in fact, become extinct because of failure of adaptation?

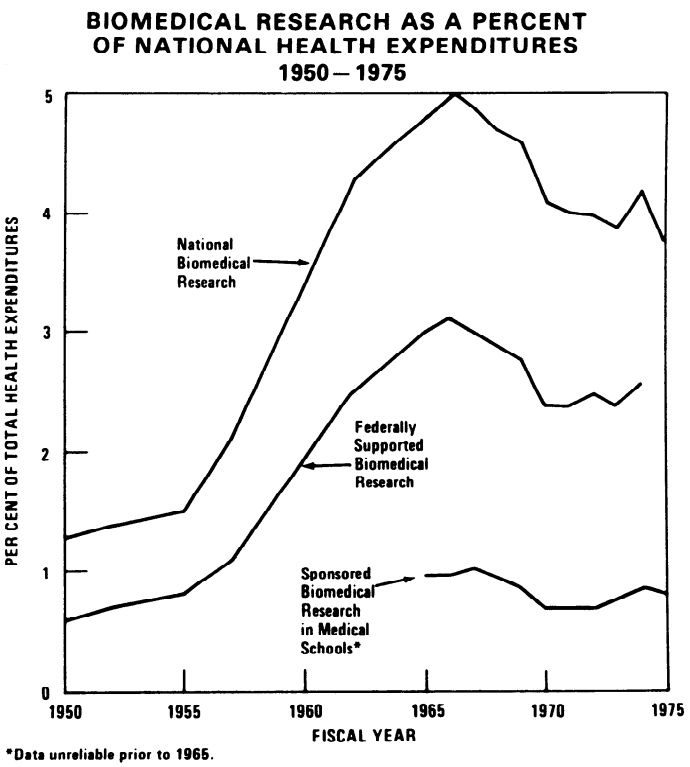


Fig. 7. Printed with permission from: *Medical Education: Institutions, Characteristics and Programs – A Background Paper,* Association of American Medical Colleges, Washington, D.C., June 1977.

IV. PHYSIOLOGY TEACHING TODAY: THE STUDENT

Since the teaching of professional students is a major concern for many if not most of us here, I would like to continue by considering several important aspects, such as the changing attitude of the students; curricula; teachers and teaching; and the role of academic research and how it relates to teaching. Needless to say, each topic could consume hours, so I will deal with them selectively, and somewhat arbitrarily as they pertain to my general theme, enunciated earlier.

The recent publicity given the Kent State students and their sit-down on the hill which was the site of 4 student killings in May, 1970, brought back vivid memories of the rebellious classes of the Vietnam and Cambodia days of the later 60's and early 70's: the student revolts and the cries for relevance of basic science courses; desire to participate in curriculum planning, and other educational activities; demand for feedback from the faculty; freedom of choice with regard to attendance at classes; and even violence and destructiveness in a few instances. "Feed-back" was indeed the order of the day (Fig. 8).

In our department at Indianapolis, we organized small groups of students drawn from each laboratory and conference section for regular meetings with the chairman, which quickly were tabbed "gripe sessions". Nevertheless, listening to student complaints appeared to have therapeutic value (Fig. 9). The staff was alerted to keep their doors open and to welcome any student who wanted to discuss a problem, raise questions about any aspect of teaching, and also listen to complaints (Fig. 10). This "open door" policy was quite effective, and altercations between the students and staff were kept to a minimum (Fig. 11).

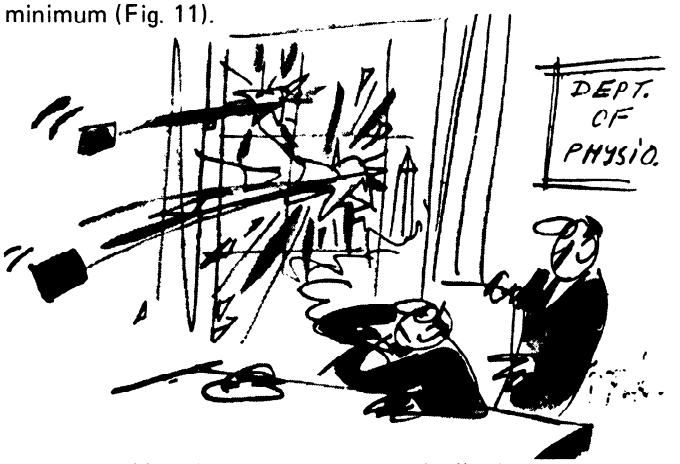


Fig. 8. *"Ah! We're beginning to get some feedback!"*

Fig. 9. NOW, BEFORE I FLUNKED OUT OF MED SCHOOL, HERE'S HOW WE HANDLED THE PHYSIOLOGY PROFS....

In 1969, as an experiment, we made attendance at all of the sessions in medical physiology (lectures, labs, conferences) optional. As a result, labs and conference sections were regularly only half-filled. In 1970, we went back to our usual policy of required attendance (although roll was not taken). However, giving weekly short written quizzes was one device used to insure conference attendance.

Today's students appear to be of a different breed. They are highly intelligent, hard-working, and tend, on the whole, not to complain or gripe as much, accepting things more or less as they are. This past spring, we returned again to experiment of 1969, i.e., making attendance at all session

non-compulsory. In surprising contrast, attendance at lectures, labs, and conference was good, with minimal absenteeism problems.

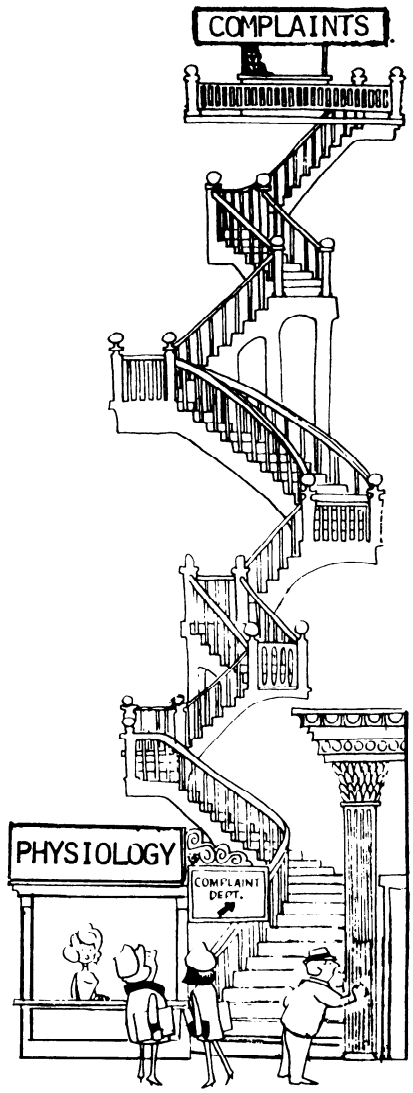


Fig. 10.

Fig. 11. ALTERCATIONS WITH STAFF MEMBERS ARE OFTEN BEST SETTLED AWAY FROM THE INSTITUTION.

A disturbing development, evidenced in the behavior of more recent pre-med and pre-dental students, is probably an outgrowth of the greater increase in numbers of applicants to professional schools, compared to places available (although also increased), as was shown on an earlier figure for medical school applicants. This development is the intense competition among the students to be acceptable to the various admission committees of medical and dental schools, resulting in tremendous pressure for high grades. As a result, cheating has been on the increase. The experience of the president of Indiana's 1976 class, Bill Beeson, is cited as an example of this:

> "When I was in college, the pressure for grades was so tremendous", he said, "that some individuals felt compelled to cheat on exams because there was so much emphasis not on how much you learned but on whether you got the grade."

Beeson himself was a victim of such desperation: while he went to cool a beaker in an organic chemistry lab a few days before a zoology exam, someone lifted his zoology notebook.

> "I had attended all the lectures and taped some of them, and I'd made some pretty elaborate drawings. Having it stolen was pretty traumatic."

The reason for the intense competition for places in medical and dental schools is probably in large measure a reflection of decreasing opportunities in other fields of science. Older, more traditional reasons no doubt remain, e.g., parental influence (Fig. 12), the eminence of doctors in the community, a real desire for human service, and last, but not least, the siren call of financial security (Fig. 13).

Fig. 12. *"But, Dad, there must be something else I can do."*

Congratulations, Son. Now here is a list of relatives and friends we want you to doctor at half-price . . .

Fig. 13. Reprinted with permission of the McNaught Syndicate, Inc.

James Reston, syndicated writer for the New York Times, has what appears a reasonable answer, at least in part, for the different behavior of today's college graduates. He states in a May, 1977, article:

> "This year's graduates have looked at the college rebels of a decade ago and find rebellious politics and the drug culture not very promising for the future".

This follows:

> "What most distinguishes the generation who have approached maturity since the debacle of idealism is not their rebellion against the religion and the moral code of their parents, but their disillusionment with their own rebellion. It is common for young men and women to rebel, but that they should rebel sadly and without faith in their own rebellion, that they should distrust the new freedom no less than the old certainties — that is something of a novelty."

He goes on to state that at all levels of American society there is not only a new questioning attitude, but a more hopeful spirit of moderation. Today's college graduates, (which represent, in part, the entering freshman classes in our various medical and dental schools this fall) have a greater freedom of choice: there is no war to fight; there are no clear heroes, villains, or ideologies.

V. THE CURRICULUM

We noted in the attitude of our new students indication that the cycle has come around full, and that a "shifting of gears" will be necessary in our teaching approaches as we move into the next decade. What is to be required will necessarily be tentative as we explore the fit of our teaching methods with today's student attitudes. Inferentially, I would suggest again that a return to something akin to Flexnerism, yet with necessary modificaitons, is indicated: more solid science, more time for our basic science disciplines, more extensive and thorough laboratory teaching, etc.

An area which invites exploration by basic scientists today is the current trend in most medical schools to offer a Senior Elective program. We should try boldly to move into this arena, offering courses in Applied or Pathophysiology, opportunities to return to special basic science courses, possibly with clinical overtones; and laboratory research opportunities. Also, as R. E. Forster recommended in 1965 (12), we should shift our interest more toward the biology departments of the rest of the university, to help develop a growing sense of unity in biology, particularly important in cellular and sub-cellular (molecular) biology. We must recognize the potential strength of biology departments in this area (Fig. 14).

So much has been said and written about curricular changes and innovations that little more need be added here. These have run along the lines of core curricula; integrated (committee) teaching, with use of multidiscipline laboratories; infusion of clinical science into the first year, etc. Speaking of core curricula, the words of the renowned medical educator and former president of APS, Dr. Maurice B. Visscher, are significant (19):

> ". . . the superficialization of the basic medical science learning experience that appears to be accepted with complacency by many seems to be incompatible with the rising importance of science in competent medical practice."

At our institution, medical physiology is taught in a trimester of twelve weeks, which necessitates heavy shovelling

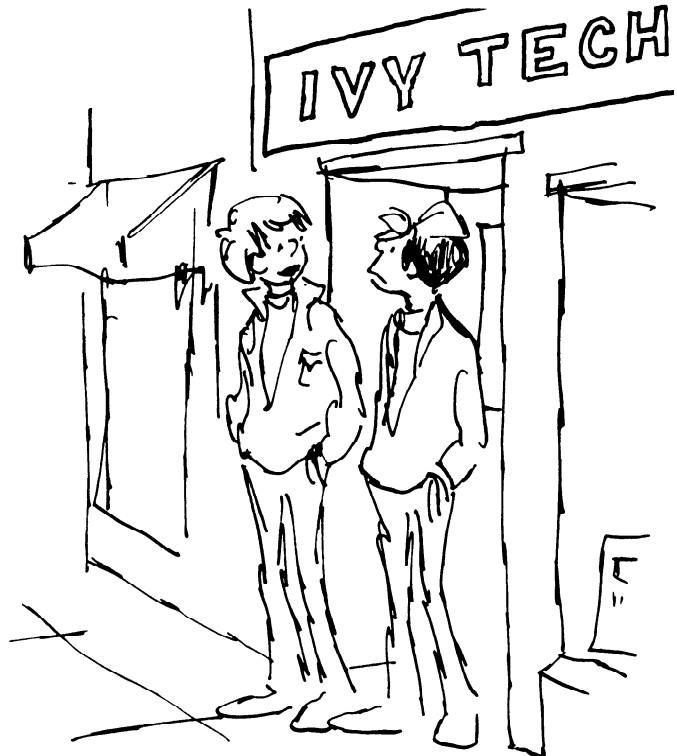


Fig. 14. Reprinted with permission of Sidney Harris, Great Neck, N.Y. from *American Scientist,* 59:469, 1971.

of a lot of material. My impression is that much of the information given to the students is retained about long enough to pass the examinations, then is soon forgotten (Fig. 15). Developing biomedical teaching should find techniques to replace memorization of facts with *principles of thinking.* We should look more toward what the educational psychologists know about learning and recall.

For some reason, this reminds me of a Polish joke (with apologies to any Poles in the audience, whom I consider actually to be intelligent people):

> A Pole called the air-line ticket office, and asked: "How long does it take to fly to Warsaw?"
>
> The young lady at the ticket office replied: "Just a minute!"
>
> The Pole replied, "Thank you", and hung up.

Fig. 15. Reprinted with permission of Sidney Harris, Great Neck, N.Y. from *American Scientist,* 65:75, 1977.

In closing this section concerned with curriculum, I will elect again to quote several medical education experts, to begin with, a surgeon, Dr. J. E. Dunphy, of the University of California, San Francisco (10): (You will no doubt sense in his statement, and the two that follow, some support of the notion that the dodo bird is *not* really extinct!):

> "Let us not forget the lessons of history. We cannot abandon an intensive grounding in the basic science as the foundation of medical education. As Flexner has said, what is dead we must drop, but simply because it comes from the past does not mean that it is dead. . . ."
> "Finally, while it may be true that no matter what is done to the curriculum the best students will survive it. It would seem to me that what is needed in medical education is not a new Flexner Report, but a renewal of the essential principles of the Flexner Report."

Dr. Vernon W. Lippard, a pediatrician and former dean of the University of Virginia Medical School, adds the following remarks (13):

> "I am going to exercise an old man's privilege of warning against the dangers of newfangled ideas. I see evidence of over-response to students' demands for relevance — a tendency to be practical, to diminish emphasis on basic science and the more theoretical aspects of clinical medicine, and (to try) to turn out in a shorter period a good old-fashioned doctor. Concurrently we are training physicians' assistants to take over the routine and more technical aspects of medical care. May we not be on a collision course? Should we not insist that graduates be *better* grounded in the basic sciences and *better* equipped to deal with complicated problems that require sound judgement than they have been in the past? I see no future for the man who is only slightly better informed than a physician's assistant." (13).

Finally, Harvey Cushing wisely stated some time ago (8) concerning curriculum reform:

> "It (curricular change) is a game (between pre-clinical and clinical departments) which will never be over, and just what the curricular score may be at the moment does not appear to make any great difference: for, provided a school secures the best available teachers for its various departments and at the same time selects its students with care, and not too many of them, the product seems to be pretty much the same, whatever the system — or lack of it."

VI. THE TEACHING OF PHYSIOLOGY, AND THE ROLE OF RESEARCH

W. H. Auden has said, "A professor is one who talks in someone else's sleep". However, we will all agree that this statement hardly does justice to the many excellent academicians here tonight and in our discipline generally. This is a resultant, I believe, of suffusing dynamism into our teaching as a consequence of our research experience. In this portion of my talk, therefore, I would like to discuss further the interrelationship of teaching and research. This old but ever-new topic is made worthy of brief review in the light of current trends already discussed.

The results of a survey by biologists in response to the question: "Does Research have a Beneficial Effect on Teaching", done in 1970 (2), came as somewhat of a surprise to me. Of 144 responses, 78% saw absolutely no need for *required* research participation on the part of undergraduate biology professors. Only 12% stated absolutely that research participation does have a positive effect on teaching and that lack of research participation leads to teaching deterioration. These data should be interpreted cautiously, when comparison with professors in professional schools is made.

For this reason, a pilot poll was undertaken by me of the opinion of chairmen of physiology departments on this issue. It yielded the following interesting results:

TABLE 1

The Relationship of Teaching and Research Ability, As Evaluated By Departmental Chairmen (37 Respondents)

Av. Number per Dept.	1. Good Researcher, Poor Teacher	2. Good Teacher, Poor Researcher	3. Good Teacher, Good Researcher	4. Poor Teacher, Poor Researcher*
A. rounded	2.0	2.0	8.0	<1.0
B. actual	(2.4)	(1.8)	(7.64)	(0.3)
C. range	0-5	0-7	1-27	0-3
Av. %	22	19	57	2

*Classification No. 4 was not solicited in this survey, but was nevertheless submitted voluntarily by 6 chairmen. Obviously, this category reflects the species *Didus ineptus*.
Size of departments ranged from 3 to 27.

In the view of physiology departmental chairmen, some 60% of their respective faculties possess the admirable quality of being good teachers and good investigators. A number of interesting comments accompanied the responses, but time does not permit reviewing these at this time. Clearly, one cannot make judgements on *cause* and *effect* here, only that these talents accompany each other. Simply stated, the problem which needs to be resolved is:

1. Does creativity in research lead to creativity in teaching?
2. *Or,* does *inherent* creativity of the teacher lead both to creativity in research and teaching?

These interesting questions need further exploration. The arguments pro and con the value of research for improved teaching seem almost endless. Arguing against the adage, "He who can, does, but he who can't, teaches", is David Seegal's counter-aphorism: "Many of those who can teach, can do, and do do". John Henry, Cardinal Newman, in the 1880's stated contrarily: "To discover and teach are distinct functions; they are also distinct gifts, and are not commonly found in the same person".

Arguing similarly, Sir William Osler remarked long ago:

> "The very best instructor for students may have no conception of the higher lines of work in his branch, and contrariwise, how many brilliant investigators have been wretched teachers?"

There are many here who would take issue with these views (see especially Davenport (9)). Only a few years ago, "research" was a magic word and to question anything done in the name of research was considered profanity. This tremendous emphasis placed upon research in physiology departments has had the disadvantage of even downgrading teaching responsibilities. The recent downward trend in research funding has led to re-evaluation of this relationship. As professional physiologists, we must work toward changing the connotation of teaching *and* research, to teaching *with* research, so that the public and federal government recognize their inseparable nature in the university.

VII. CONCLUSION

Dr. J.A.D. Cooper of the AAMC has recently pointed out (7) that there is every reason to believe that medical education in this country will continue to steer a turbulent course during the last quarter of the twentieth century. He states further that the medical schools are already being accused of not being responsive to social needs (e.g., not concerned with maldistribution of physicians). The curriculum is being challenged by many as not relevant to the education of physicians to meet today's needs. The value of research is being questioned with increasing frequency, and support for targeted, managed research is displacing that for investigator-initiated research.

Past-President Loren D. Carlson reminded the society in 1969 (5):

> "We can no longer live in an ivory tower and insulate ourselves from political, economic, and social pressures".

As faculty members, as physiologists, and as members of APS, we will need to adapt our teaching to the burgeoning body of knowledge in Biomedical Science, and the changing student attitudes. We will have to be alert to necessary curricular changes, with open and ready minds and flexible attitudes. We will seek to correct, or adjust to the loss of training and research grants.

What about the question: "Is the Dodo Bird *Really* Extinct?". Frankly, I will have to straddle this issue. I note traces of Dodoism lingering in much of our thinking and action. This is not entirely bad, as I have tried to advocate earlier, since we can salvage and learn from the past. On the other hand, it is obvious that we must be forward-looking and adaptable. I believe my thinking can best be summarized by an extract from Eccliastes, Chapter 3, to quote:

> "There is a right time for everything:
> [2]A time to be born; a time to die;
> A time to plant; A time to harvest;
> ——
> [3]A time to destroy;
> A time to rebuild,
> ——
> ——
> [6]A time for keeping;
> A time for throwing away
> ——
> [7]A time to tear;
> A time to repair;"

I would like to add my own verse:

> There is a time to look backward;
> A time to look ahead.

In brief, this summarizes my thoughts, and my position.

Now, in closing, I would like to resurrect an old aphorism: "Old soldiers never die; they just fade away". More modern versions include such as these: "Old golfers never die, they just lose their (golf) balls"; and, "Old joggers never die, they just disappear under a layer of Ace bandages".

Finally, Dr. Hermann Rahn has come up with a very appropriate one:

> "Old physiologists never die; they just slowly lose their grants". (Fig. 16).

So I am going back to Indianapolis and get busy again in my lab; for in the final analysis, I and the rest of you must surely believe in the axiom: We must publish, or perish!

Fig. 16.

Selkurt, "What you need is a massive infusion of federal funds!"

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ROBERT FRANKLIN PITTS

(1908-1977)

Ewald E. Selkurt, Past-President, APS

Dr. Robert F. Pitts, thirty-fourth President of the American Physiological Society (1959-60), died on June 6 in Dowling Park, Fla., at the age of 68. At the time of his death, Dr. Pitts was Research Professor at the University of Florida School of Medicine. After 25 years as Chairman of the Department of Physiology, Cornell University College of Medicine, Dr. Pitts was given a six year research grant in renal medicine and physiology, in the Division of Renal Medicine at the Gainesville school, where he was given the key to the city. His poor health forced him to discontinue his work last June.

His renal research, which began when he joined Dr. Homer W. Smith and Dr. James A. Shannon at New York University School of Medicine in 1932, led to a world wide reputation for studies that helped provide a fundamental understanding of the way the kidneys excreted acidic wastes and thereby maintained the body's delicate biochemical balance between acidic and alkaline states.

Application of the information gained from research conducted by Dr. Pitts and other scientists has led to standard therapies in the daily practice of medicine. For example, principles learned from his type of research are applied routinely after surgery when patients are given intravenous fluids to control acid-base and electrolyte and water imbalance. Indeed, because of his many original and unique studies, some have dubbed him the "Columbus of the Kidney."

Robert Franklin Pitts was born in Indianapolis, Indiana on October 24, 1908. After graduation from Butler University in 1929, Dr. Pitts earned a Ph.D. in zoology from Johns Hopkins in 1932 and went to New York University. Here, it was from Dr. Smith that Dr. Pitts learned about the practice of self-experimentation.

While teaching and doing physiologic research at N.Y.U., Dr. Pitts earned his M.D. degree in 1938 while holding the rank of Assistant Professor of Physiology. He became a Rockefeller Foundation Fellow (1938-1939) and then went to the Neurological Institute at Northwestern University in Chicago and to the University of Pennsylvania.

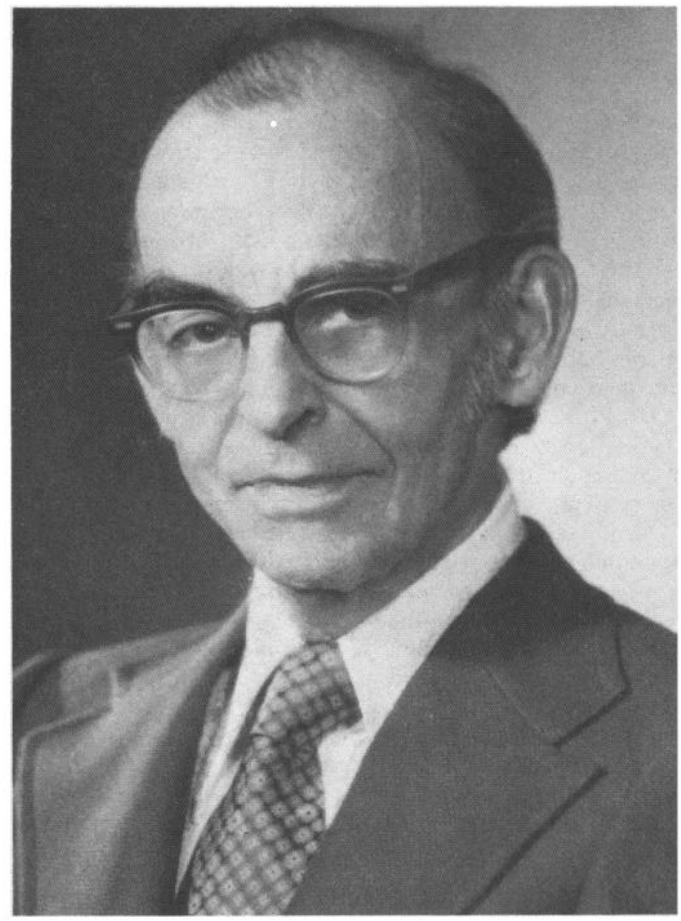
Between 1938 and 1942, Dr. Pitts gained an international reputation for his fundamental studies on the brain's role in controlled breathing. Through studies on cats, Dr. Pitts identified the hind brain centers and the neurological pathways that controlled respiration. From 1942-1946 he transferred his activities to Cornell University College of Medicine, as Assistant, then Associate Professor.

After World War II, in 1946, Dr. Pitts went to Syracuse University to head the Department of Physiology. He returned to New York in 1950 to head Cornell's Physiology Department.

In 1970 he was named first Maxwell M. Upson Professor, a chair established in honor of a longtime member of the University's Board of Trustees.

When Dr. Pitts retired, in June 1974, the Department of Physiology held a symposium on kidney metabolism in his honor. International authorities, including Dr. Pitts himself, spoke at the symposium.

The contributions Dr. Pitts made to renal physiology and nephrology are excellently and succinctly reviewed in the article by D.A.K. Black in the special dedicatory issue to Dr. Pitts of NEPHRON (6:164-172, 1969). These fall into three



categories: (a) *Acidification of the urine.* Here, he and Dr. Robert S. Alexander in 1945 clearly proved that in acidotic dogs there was much more titratable acid in the urine than could be present in the glomerular filtrate. They proposed the mechanism that hydrogen ions were actually secreted by the nephron. Additional work followed on the linkage of this mechanism to exchange with Na^+ and concordant reabsorption of bicarbonate (Pitts and Lotspeich, 1946). (b) *Diuretic agents.* His scholarly review of diuretic activity goes back to 1959. [The Physiological Basis of Diuretic Therapy (Thomas Springfield, Ill., 1959).] His main work was with the mercurials, which he proved acted by inhibition of tubular reabsorption of salt and water, and not by increase in glomerular filtration rate. He used the then innovative "stop-flow" technique to localize the mercurial activity in the nephron. But he knew of the newer diuretics which were appearing, such as chlorothiazide, and wisely predicted the greater diuretic potency of this agent than others, such as acetazoleamide and dichlorphenamide. (c) *Renal formation of ammonia.* In the most recent research epoch, Pitts and his colleagues have contributed important knowledge pioneered by the distinguished earlier workers in this field, T.D. Nash, S.R. Benedict, and D.D. Van Slyke. This involved a working out a more detailed scheme of operation of the various other precursers besides glutamine, and that only 43% of urinary ammonia was derived from the amide nitrogen of glutamine, and 18% of ammonia nitrogen from the amino nitrogen of glutamine. The

importance of NH_3 in the ion exchange mechanism of the distal tubule was established (formation of NH_4^+ and its diffusion trapping in the lumen, to exchange for Na^+ in the base conservation mechanism).

In virtually all these studies that involved humans, Dr. Pitts carried on a medical tradition by doing the first experiment on himself.

"He always told students and other doctors that if you think any experiment is ready to be tried on humans, you must be the first subject, and he always did that himself," Dr. David D. Thompson, the Director of Cornell's teaching facilities at New York Hospital, said. Dr. Thompson had studied with Dr. Pitts for several years. When Dr. Pitts examined the action of the earliest type of diuretic drugs – those containing mercury – he took the injections administered by colleagues. Further, when he studied the effects of a particular amino acid on the body's physiology, Dr. Pitts ingested the amino acid and then collected his urine for the necessary measurements.

Dr. Pitts' writing style is reflective of the personality of the man. This is beautifully summarized by Dr. D. W. Seldin in the Introduction of the dedicatory issue of NEHPRON. I take the liberty of repeating here one of the key paragraphs:

"No description of the unique contributions of Pitts would be complete without at least a brief allusion to his prose style. It is neither witty nor rich. There is nothing of the sparkle and verve that animate the marvelous papers Homer Smith contributed from time to time to the Bulletin of the New York Academy of Medicine. The sonorous tone, the Victorian richness that John Peters could infuse into his best writing is almost totally missing. Yet in its own way his style is at least as distinctive as those of his predecessors. The inner reserve, the carefully preserved distance of the man, are everywhere apparent in the prose. It is distinguished by crystalline clarity and stately movement. The meticulous balancing of phrases and clauses, the austere dignity with which his argument is formulated, are reminiscent of the lucidity and formality of Restoration writing. No one who is interested in the language could fail to be moved and perhaps surprised to find, in a modern medical paper, the graceful eloquence of the opening pages of his Harvey Lecture." (Harvey Lect. *48:*172, 1953)

Also exemplifying his style is his ever popular monograph "Physiology of the Kidney and Body Fluids." (Year Book Medical Publishers, Inc., Chicago, 3rd Edition, 1974)

As a person, Dr. Pitts was highly admired and respected. He was, however, basically a quiet man, reflective, often somber. Dr. Heinrich Wirz, in introducing him at a reception at a symposium held in Brestenburg, Switzerland in 1971 stated, "He is like one of the high mountains of our beloved Alps, distant, aloof, demanding of respect and admiration." To me, who has known him since 1941 when I came to Homer Smith's department, and to others who knew him closely, he was a warm, thoughtful, and delightful companion, with a fine sense of humor and a provocative personality. Such was our reaction when John Pappenheimer, Mrs. Selkurt, and I travelled through Germany together with him in the spring of 1954. The three of us were members of the Unitarian Service Committee on Kidney, and Bob was the leader of our team.

Dr. Pitts was a member of the National Academy of Sciences, a Fellow of the American College of Physicians, and active in other scientific organizations: American Academy of Arts and Sciences; Study Section, NIH; NRC Advisory Committee on the Army Medical Services Graduate School; Chairman, *Renal Function,* Josiah Macy Foundation; Advisory Board of the Life Insurance Medical Research Fund; Lederle Medical Faculty Awards Committee; NRC Medical Fellowships Awards Committee, American Physiological Society (Board of Publication Trustees, Member of Council); Society for Experimental Biology and Medicine, Harvey Society (President, 1960), Society for Clinical Investigation. He was also a member of the following scholastic and scientific honorary fraternities: Phi Beta Kappa, Sigma Xi, Phi Kappa Phi, Phi Delta Theta, and Alpha Omega Alpha.

Of his many awards, his friends said he was particularly proud of being the first recipient of the Distinguished Teaching Award of the Association of Chairmen of Departments of Physiology in 1972. In part, the Award recognized his fine lecturing style, characterized by excellent organization and clarity, and by his precise delivery. Other awards he has received include: Gail Borden Award of the Association of American Medical Colleges, 1960; Medical Alumni Research Award N.Y.U., 1962; the Homer W. Smith Award, N.Y. Heart Assoc., 1963; and the Adam T. Bruce Fellowship.

He received an honorary Doctorate of Science from Indiana-Purdue University, Indianapolis, in June, 1976.

Dr. Pitts became a widower in 1970 when Marjorie, his wife of 34 years, died. He is survived by a son and daughter, Robert Wallace Pitts of Chicago and Marjorie Ann Pitts of Falls Church, Va.; a sister, Rebecca, of Indianapolis, and a grandson.

His family has announced that Dr. Pitts made a bequest for a scholarship or prize for excellence in physiology at Cornell University Medical College.

PERSONAL REMINISCENCE

Erich E. Windhager

Pitts' most outstanding characteristic was his almost total commitment to laboratory bench work. He continued to do this until he was physically unable to do it any more. This penetrated every aspect of his life, and also influenced the ways things were done in his department. Matters concerning the department were occasionally discussed in the morning before he started the experiment, sometimes in the evening and then on those days on which the experiment hadn't worked out for technical reasons. Most members of the department followed his example and there was always the priority of the experiment over other items. It was a typical experience to hear the door open while we were doing an expermient and then being closed as noiselessly as possible: invariably it was Pitts who had wanted to talk to one, but did not dare to disturb the experiment.

Pitts "left people alone", meaning that in research, the investigator was considered absolutely responsible for selection of projects, design, and execution of experiments and interpretation. He made it also a rule not to manipulate research funds in the department. Admittedly, times were easier then than now. He was an individualist and this philosophy expressed itself also in his view on originality and productivity in research.

Despite the relative abundance of funds available during the 50's and part of the 60's, Pitts kept his research expenditures to a minimum. He was very austere and I remember more than once, that substantial sums of unused money were sent back by him to N.I.H.

He attended every single lecture given to the medical students and he, himself, ran a student laboratory at all times during the course. Students respected him greatly, trusted him,

and found it easy to talk to him. He always felt that teaching of medical students was the primary responsibility of the staff. He acted accordingly, but at the same time, jealously protected our time for research such that it always amounted to about 2/3 to 3/4 of our total time.

He had close and long lasting ties to members of this department, almost to the exclusion of other contacts, except his family. His only hobby was to be a ham operator during the time when he still lived in his house in Pelham in Westchester County. Later he spent his – what is commonly called – leisure time in reading a book once in a while and in taping operas on his stereo set. I know that by the time he left New York for Gainesville, he had already recorded quite a number of first rate productions of operas and was looking forward to listening to them down in Florida.

Personally, I first met Pitts, very briefly, when I was an Intern in the Department of Medicine at the University of Vienna Medical School in 1954. It was another 4 years before I saw him again and at that time asked him if he would give me a job, which he did. During the subsequent years the opportunity never developed that I would personally work together with Pitts in his experiments. Still, a close relationship developed in which I obviously considered him a senior advisor and father figure. As you might gather, I have always had the highest regard for him as a person. I found him exceptionally strong in carrying the load of his wife's sickness and his own health problems. In his private life and his professional career the main theme that I could detect was his sense of responsibility.

PERSONAL REMINISCENCE

Gerhard Giebisch

One of the striking features of Dr. Robert Pitts, one might mention, was his extreme loyalty to his associates, his encouragement to those he considered gifted and a strong esprit de corps in his department.

In addition, he rated teaching very high, attended all lectures and particularly in an exemplary fashion in all teaching activities. He was, almost until the very end, a very hard worker on the bench and did his own Van Slykes until late at night and there was no detail of his work which he did not consider worth his attention. Although usually stern and reserved, he could warm up, particularly at a party after a drink or two, and then was a delightful person with great warmth and sympathy.

The International Physiological Society, and I am grateful to Klaus Thurau for his support, has decided to hold, from now on, at each of their meetings, a Robert F. Pitts Lecture.

I hope this will help to honor our Robert F. Pitts and to keep his name known.

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THANK YOU FROM THE PUBLICATIONS COMMITTEE

Dear Colleague:

Since the journals of the Society were reorganized (April 1976) more than 1200 Guest Referee Editors have helped the 200 Editors and members of the Editorial Boards in reviewing manuscripts. The number of manuscripts submitted to the *American Journals of Physiology* and *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* has increased markedly. This is clearly shown in the following table, which lists the number of manuscripts received and percentage increase in succeeding six-month periods.

January	– June	1975	. . . . .	839
July	– December	1975	. . . . .	842 +0%
January	– June	1976	. . . . .	881 +5%
July	– December	1976	. . . . .	946 +7%
January	– June	1977	. . . . .	1030 +9%

The Publications Committee wishes to thank all of you for your support.

Sincerely,

Alfred P. Fishman, Chairman
Publications Committee

HONORS AND AWARDS

This Spring, the National Academy of Sciences elected 60 American scientists and engineers to membership in the Academy. Two APS members were recipients of this honor:

Dr. Floyd E. Bloom, Director, Arthur Vining David Center for Behavioral Neurobiology, The Salk Institute for Biological Studies, San Diego, California, and

Dr. Richard F. Thompson, Professor of Psychobiology, University of California at Irvine.

Dr. William J. Tietz, Jr. became President of Montana State University in Bozeman on August 1. Previously, Dr. Tietz had been Professor and Dean of the College of Veterinary Medicine and Biomedical Sciences at Colorado State University.

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VISITING APPOINTMENTS TO THE UNIVERSITY OF CALABAR, NIGERIA

The following letter was written to Dr. Ganong on June 28, 1977:

Dr. William F. Ganong
Department of Physiology
University of California
School of Medicine
San Francisco, California

Dear Dr. Ganong:

Re: Secondments to the new Medical School to be established at Calabar.

I have been in touch recently with a former colleague of mine, Dr. A. Olufemi Williams who is now Dean of the new Faculty of the University of Calabar, Nigeria.

He is seeking help in staffing the new institution and is specifically asking for secondments from established medical schools for periods of 6 months to a year (or longer if feasible).

The following are the relevant details:

1. The Medical School is to open on August 15th, 1978. Teaching will commence 1st October, 1978.
2. The medical course is to be a four year course, more or less on traditional lines as practiced in the United Kingdom, that is to say Department based rather than systems teaching, with a good deal of streaming rather than block teaching. The first year – which I have been particularly asked about – will deal with anatomy, physiology and biochemistry – which will include those subjects which have established themselves here in independent departments, namely histology, cell biology, elementary genetics, statistics.
3. Number of students per year – is aimed at 100 who will enter medical school direct from high school having attained the equivalent of the British 'A' levels. I think the nearest equivalent here would be grade 13 with a strong concentration on the sciences, namely Physics, Chemistry, Zoology and Botany – sometimes with advanced mathematics, but always with mathematics at '0' level.
4. Secondees will be paid as follows:

Full professors	– N. 12,000 p.a.
Senior lecturer	– N. 10,000 p.a.
Lecturer	– N. 9,000 p.a.
exchange rate	– N. 1.0 = $1.60

A full professor is a full professor in any language. A senior lecturer in the Nigerian University sense equates to an Associate Professor (however, since there are fewer full professors proportionate to the total faculty than in America, the real equivalence may be somewhere between associate and full professor). In the British system a Senior Lecturer is a respectable career grade to aim at from the start. A lecturer equates roughly to somewhere in between Associate and Assistant Professor.

Arrangements have been negotiated for the upgrading of the salaries of U.S. citizens so that their salaries can be paid in full on the home based rates, partially from Nigerian sources which cover the local rates, partially from U.S.A. I.D. sources which cover the balance. There are no such arrangements yet for Canadians. The best present compromise is to arrange the secondment in terms of a sabattical leave if this can be done, balancing the usual rates from the home University with local sources.

5. Other benefits. Subsidized housing will be available. 144 housing units are approaching completion. These comprise mainly bungalows with two bedrooms (sometimes three), a study, convertible to a bedroom if need be, a large lounge cum dining room, a verandah which in itself is a very agreeable lounging area, kitchen and, as the saying goes, the usual offices. As I understand it a rent of N. 50.00 will be charged.

I have no information about cost of electricity or other charges.

Cars – a generous car allowance is offered. Also, if needed, car advances for the initial purchase of cars. I cannot speak for to-day, but my own experience in the past was always that the purchase of cars was relatively cheap however you did it. Gasoline, however, was expensive, as was insurance.

6. The secondee will be encouraged to visit other centres, especially in the north where they are particularly short of staff in their new medical schools.

7. Climate. I have no official information, only a rather unreliable memory. Calabar is a place I have visited twice, before the civil war. It was a fascinating place situated on the Cross River. It is said that the Cross river was the original river of Sanders of the River and that Calabar was the unmentioned headquarters to which the ocean liners came. Certainly it is a deep water port, though well inland. To me it is the only part of Nigeria which looked in the least like Edgar Wallace and Hollywood would have us believe Nigeria should look. It is a thickly forested land, hot and humid for much of the year with a heavy rainfall in season. It is a land which has seen much misery in its day. It is still not hard to visualize the slave hulks lying off-shore, replaced in more enlightened days by ships dealing in the palm oil trade. Nor was all the brutality from outside. There were fierce relentless spirits in the forests and the courage of the missionaries in facing them is something never to be forgotten. Mary Slesser, a name that shines among many, is buried in Calabar. In more recent times there was the cruelty of the civil war and the destruction was sad to behold. But one thing should be remembered about this war and that is that on its conclusion there were no pogroms, no slaughter of anyone, innocent or otherwise. There was a remarkable all round forgiveness and coming together. Conqueror and rebel are now together and have done a remarkable job of rebuilding a torn country. Calabar, neutral politically, but physically remote from Lagos and its protection suffered terribly but is now rebuilding fast. The people of Calabar are a charming folk and a delight to deal with.

Let us, however, not forget that once this was the white man's grave. "Beware, beware the Blight of Benin, where few come

out though many go in". This was the charming little ditty that once applied to this part of the world. The life expectancy of oil traders and others was terrifyingly short. And all this was on account of the mosquito. In terms of numbers the West African mosquitoes are compared with the teeming legions of North America, nor do they have half the ferocity. They are lambs compared with the black fly. The trouble is that every one of them has malaria, benign, malignant, or both. Fortunately to-day, though the mosquitoes still have it there is no excuse for any human getting malaria; it can be prevented with near certainty. Otherwise, there are no special risks. The health hazards are probably no greater than those of Toronto, given reasonable common sense and the application of simple rules.

The only other comment I would make to establish my credentials, is that I, personally, spent twelve years in Nigeria. I left for purely professional reasons and I am returning on a sabattical leave of the kind I mention above in January 1978 during which I shall spend some time in Calabar, though my main destination is Ife, near Ibadan.

If there is any further information I can give please let me know.

Sincerely,

John Grayson, M.Sc., Ch.B., M.D., D.Sc.
Professor of Physiology
University of Toronto

Note: Dr. Ganong suggests that any physiologists who are interested contact Dr. A. Olufemi Williams directly.

WHERE ARE THEY NOW ?

A recent survey of our member mailing list identified a number of individuals who had been assigned bad address tags because the Postal Service had returned their mail marked "undeliverable, no forwarding address." As a result these members have been dropped from the mailing list until the new addresses can be obtained.

We are of course anxious to reestablish communication with these "lost" members. If readers of *The Physiologist* know the whereabouts of any of the following, please advise the individual that we have been looking for them, or, notify the Executive Secretary's office of their current whereabouts.

Robert L. W. Averill
Olaf Bergeim
Donna J. Brown
Simon Dworkin
Florence W. Haynes
Harold L. Higgins
Hyun D. Kim
John R. Smith
James E. Webster

SUSPENSION OF DELINQUENT MEMBERS

At its Spring 1977 meeting, acting on the advice of the Finance Committee, Council established a category of "Member (Suspended)" for those members who do not pay their dues on time. Members placed in this category will not receive Federation or Society mailings normally sent to members, in order to avoid the considerable expense associated with members who are dropped after being two years in arrears in dues.

In their report to Council, the Finance Committee discussed the problems created by the untimely payment of dues (which may be more serious in the future, since the Society is required to pay Federation membership assessments shortly after July 1st each year). If a delinquent member subsequently resigns or is dropped after two years (as required by the Bylaws) the Society has lost the money advanced to the Federation.

The Society will no longer pay Federation membership dues for any member who has not paid Society dues by July 15. Nothing, however, will be done with the records of a suspended member until September 1, when the name will be removed from the mailing list. The member will stay in the "Suspended" category until such time as the dues are paid, at which time he or she would automatically be returned to good standing. If at the end of two years the dues had not been paid, the member will be dropped from membership as required by the Bylaws. Members dropped after two years for non-payment of dues can be reinstated only with Council's formal approval after dues have been fully paid.

A "member (Suspended)" will continue to enjoy the APS Bylaw derived privileges to 1) subscribe to journals at membership rates; 2) attend the Business meetings of the Society and vote; 3) register at the annual meetings at membership rates; and 4) present or sponsor papers.

Council also directed that the third dues notice sent to delinquent members on July 15 contain information that the member had been suspended.

EASTERN STUDENT RESEARCH FORUM

The Forum will be held February 5-7, 1978 at the University of Miami School of Medicine. The deadline for abstracts is set at December 1, 1977. The Forum is open to all medical and graduate students with excellence in research awards and other categorical awards, as well as cash awards. For further information contact: ESRF, P.O. Box 520875, Biscayne Annex, Miami, Florida 33152. Telephone (305) 547-6791.

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CAROLINE TUM-SUDEN

The Society has received an extremely generous bequest (in excess of $100,000) in the will of Caroline tum-Suden. Dr. tum-Suden was born in 1900, became a member of the Society in 1936, and died on January 24, 1976.

The Council has been discussing for some time the establishment of a general Endowment Fund of the Society, to provide funds for a variety of societal programs without relying on members dues or external grants of uncertain continuity. Dr. tum-Suden's bequest provides an excellent nucleus about which such an endowment fund can be built. A description of the Endowment Fund, its purposes and mechanisms of operation will appear in an early issue of *The Physiologist,* probably December 1977.

In the meantime Dr. Bruce Dill who was a long-time friend and colleague of Dr. tum-Suden has written the accompanying vignette of the Society's benefactor.

Caroline tum-Suden shortly after receiving her M.A. at Columbia in 1927 came to Boston where I became acquainted with her. She was associated with Boston University for some years receiving her PhD in 1933. She was an Evans fellow and then an instructor in the Boston University Medical School leaving in 1947 to become an assistant professor at Mt. Holyoke. In 1950 when I was Scientific Director of the Medical Laboratories, Army Chemical Center I sought out Caroline to fill a vacancy as neurophysiologist-pharmacologist.

From 1950 our friendship continued to develop. Within a few years I guess Chloris and I became her best friends. She called on us for advice on the purchase of a small tract and tiny cottage about two miles from us in Harford County. She was a skilled gardener and delighted in her flowers and shrubs. We always called on her on return visits after my retirement in 1961. Our last visit in 1975 found her badly crippled with arthritis and with other ailments. We were grieved but not surprised when news came of her death Jan. 24, 1976.

Caroline worked with Henry Wills and Amedeo Marrazzi. She was devoted to her research and diligent in seeking solution of the problems that arose. Perhaps conscientiousness was her most outstanding characteristic. Many times she expressed to me her feeling that she was not earning her salary and was not easily reassured. Much of her work was unclassified so she was able to submit abstracts and present papers at Society meetings. These meetings were the highlights of her professional life.

As a young woman Caroline was physically fit having been an instructor in the Sargent School of Physical Education in Boston. Tragically her face became deeply lined but her sense of humor overrode this infirmity. She once told me the story of a pass made by a soldier in the Grand Central Station. Approaching from behind and attracted by her trim figure he placed his arm around her waist but when she turned he apologized, "Oh, excuse me, grandma." Caroline got a big laugh from telling that story.

Caroline was dear to us: we have happy memories of her. On one occasion Coy Crouse who was responsible for the animal colony heard a terrific uproar by the dogs. When he arrived he found Caroline prancing up and down waving her skirts. When Coy admonished her she explained, "I decided to relieve their boredom."

1978 HARWOOD S. BELDING AWARD IN ENVIRONMENTAL PHYSIOLOGY

The Environmental, Thermal, and Exercise Section of the American Physiological Society will present the Annual Award to a graduate student at the Temperature Regulation Dinner during the Federation Meetings, April 9-14, 1978. The Award includes a prize of $150.

REQUIREMENTS

1) The graduate student applicant must plan to give the paper at either the 1977 Fall or 1978 Spring meetings of the APS. He or she must be first author on the abstract which is published in the *Physiologist* or the *Federation Proceedings.*
2) A requirement for receiving the Award is the attendance of the student at the Temperature Regulation Banquet. In case of illness he or she could still receive the Award by a vote of the Award Committee.
3) The typewritten copy of the presentation with illustrations should be submitted. Alternatively, a manuscript which is ready for publication may be substituted. Manuscripts must be received by *March 1.*

The winner of the 1976 Award was Linda K. Vaughn of the University of Michigan. The title of her paper was "Fever and Survival in Bacterially Infected Rabbits."

Manuscripts for the Belding Award should be mailed to:

Dr. Ethan R. Nadel
John B. Pierce Foundation Lab.
290 Congress Avenue
New Haven, Conn. 06519

INTERNATIONAL CONFERENCE ON SIGNALS

The conference will take place in Paris from April 10 to 14, 1978. This international conference is dedicated to signal and image processing in Medicine and Biology, Biosigma 78. The scope of the Conference is to deal with images and signals from various fields. Neurophysiologic signal processing, radiological, nuclear, acoustical imaging will be discussed. Corresponding equipments and systems will be described and evaluated. For further information contact Dr. Y. Amram, Chairman, Scientific Committee, Biosigma 78, 11 rue Hamelin, 75783 Paris Cedex 16, France.

* * * * * *

INSTRUCTIONS FOR APPLYING FOR APS MEMBERSHIP

At the April 1977 business meeting the proposed Bylaws Amendment for creating a new membership category for Students was passed. This Bylaw Amendment appears under Section 7 of Article III of the Constitution, printed below.

CURRENT APPLICATION FORMS

Starting with this issue, The Physiologist shall routinely carry one copy of the current application form (following). This form will serve for all categories of membership. Any member desiring to sponsor more than one applicant may use a Xerox copy of this form. Any application submitted on an out-dated form will be returned to the sponsor to be redone on the acceptable form.

One application form serves all membership categories. There are, however, specific sets of instructions for each category. Therefore it is essential that sponsors and applicants carefully attend to those instructions specific to their desired category.

GENERAL INSTRUCTIONS

FOR ALL CATEGORIES:

Use only the current application form. Check the box indicating the category of membership for which you are applying. Use the SPECIAL INSTRUCTIONS for that category when filling out the form. Type the Application. Fill out all applicable spaces. Only completed applications will be reviewed.

The Bibliography must be submitted in the form found in the Society's journals. An example of the correct form is:

JONES, A.B., and C.D. Smith. Effect of organic ions on the neuromuscular junction in the frog. Am. J. Physiol. 220:110, 1970.

Send no reprints.

Deadline Dates: Completed applications received between February 1 and July 1 are considered for nomination by the Council at the Fall Meeting. Applications received between July 1 and February 1 are considered for nomination by the Council at the Spring Meeting. Applications are not complete until all materials, including sponsor's letters, are received.

QUALIFICATIONS (Except Students):

The Membership Advisory Committee uses the following 5 categories in evaluating an application:

1. Educational History. Academic degree and postdoctoral training are evaluated and assessed with regard to how closely the applicant's training has been tied to physiology.
2. Occupational History. Particular emphasis is given to those applicants who have a full time position in a department of physiology, or are responsible for physiology in another department. Relatively high ratings are given to people with positions in clinical departments and to people functioning as independent investigators in commercial or government laboratories.
3. Contributions to the Physiological Literature. This category is of major importance. The applicant's bibliography is evaluated on the basis of publications in major, refereed journals which are concerned with problems judged to be primarily physiological in nature. Emphasis is given to papers published as the result of independent research. Special note is taken of publications on which the applicant is sole author or first author.
4. Interest in and Commitment to Teaching Physiology. This evaluation is based on: (1) the fraction of the applicant's time devoted to teaching, (2) publications related to activities as a teacher including production of educational materials, and (3) special awards or other recognition the applicant has received for outstanding teaching effectiveness.
5. Special Considerations. This category permits the Membership Advisory Committee to acknowledge unique accomplishments of an applicant. These might be excellence in a specific area, or unusual contributions to Physiology resulting from talents, interest or a background substantially different from the average.

SPONSORS:

Primary responsibility for membership rests with the two sponsors who must be regular members of the Society. Sponsors should discuss the appropriateness of the selected category of membership in this Society with prospective applicants.

Each sponsor should write an independent confidential letter about the candidate using the five categories listed above to evaluate the candidate.

CHECK LIST:

1. Original copy of application signed by both sponsors.
2. Application on a current form, including the bibliography (1 original and 7 copies).
3. Mail the original, which has been signed by the two sponsors, plus 7 copies to:

Executive Secretary
American Physiological Society
9650 Rockville Pike
Bethesda, Maryland 20014

SPECIAL INFORMATION AND INSTRUCTIONS

FOR REGULAR MEMBERSHIP

Bylaws of the Society:

Article III, Section 2 - Regular Members. Any person who had conducted and published meritorious original research in physiology, who is presently engaged in physiological work, and who is a resident of North America shall be eligible for proposal for regular membership in the Society.

IF ALIEN: Please attach a letter and 7 copies stating visa status and type of passport and giving evidence of intent to stay in North America.

Duties and Privileges:

1. Hold Elective Office.
2. Vote at Society Meetings.
3. Serve on Committees, Boards and task forces.
4. Serve on Federation Boards and Committees.
5. Sponsor New Members.
6. Orally present or co-author a contributed paper and sponsor a non-member authored paper at the Fall scientific meeting.
7. Orally present or co-author one contributed scientific paper at the annual Federation meeting or sponsor one paper.
8. Receive the Society publications, The Physiologist and The Physiology Teacher.
9. Receive Federation Proceedings.
10. Subscribe to handbooks and periodicals published by the Society at membership rates.
11. Register to attend scientific meetings of the Federation and the APS Fall meeting at membership rates.
12. Participate in FASEB Member's Life Insurance Program, Disability Program and in Hospital Protection Plan. (For Residents of the United States, its territories or possessions).
13. Eligible to receive the Daggs Award.
14. Eligible to be selected as Bowditch Lecturer (members under 40 years of age).

FOR CORRESPONDING MEMBERSHIP

Bylaws of the Society:

Article III, Section 3 - Corresponding Members. Any person who has conducted and published meritorious research in physiology, who is presently engaged in physiological work and who resides outside of North America shall be eligible for proposal for corresponding membership in the Society.

Duties and Privileges:

1. Serve on Society Committees, Boards and Task Forces.
2. Serve as one sponsor of new Corresponding Members (One regular member must be sponsor of a new Corresponding Member).
3. Orally present or co-author a contributed paper and sponsor a non-member authored paper at the Fall scientific meeting.
4. Orally present or co-author one contributed scientific paper at the annual Federation meeting or sponsor one paper.
5. Receive the Society publications, The Physiologist and The Physiology Teacher.
6. Receive Federation Proceedings.
7. Subscribe to handbooks and periodicals published by the Society at membership rates.
8. Register to attend scientific meetings of the Federation and the APS Fall meeting at member rates.

FOR ASSOCIATE MEMBERSHIP

Bylaws of the Society:

Article III, Section 5 - Associate Members. Persons who are engaged in research in physiology or related fields and/or teaching physiology shall be eligible for proposal for associate membership in the Society provided they are residents of North America. Associate members may later be proposed for regular membership.

Duties and Privileges:

Same as for Regular Members except for the privilege of:

1. Holding Executive Office, or membership on certain committees.
2. Voting at Society Meetings.
3. Sponsoring New Members.
4. Receiving the Daggs Award.
5. Selection as Bowditch Lecturer.

FOR STUDENT MEMBERSHIP

Not all questions on the application form may be appropriate – Please place NA next to any such question.

Bylaws of the Society:

Article III, Section 7 - Student Members. Graduate students in physiology who have completed their preliminary examinations for the doctoral degree provided they are residents of North America. No individual may remain in this category for more than five years.

Duties and Privileges:

1. Present one contributed paper at the Fall Scientific meeting with the endorsement of the student's advisor.
2. Receive the Society publications, The Physiologist and The Physiology Teacher.
3. Subscribe to Handbooks and Periodicals at member rates.
4. Register to attend scientific meetings of the Federation and the APS Fall meeting at student rates.

APPLICANT'S LAST NAME _____

3. **DESCRIBE YOUR PHYSIOLOGICAL TEACHING** – What percent of your time/effort is spent in teaching Physiology?_____

Describe in the space provided your teaching of physiology including course descriptions (content, format); supervision of pre-doctoral and post-doctoral students; special contributions (films, textbooks, etc.).

4. **INTEREST IN THE SOCIETY** – List any APS Meetings attended by date and check the appropriate box for any papers.

SPRING (FASEB)			FALL (APS)		
Date	Presented	Coauthor	Date	Presented	Coauthor
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐

List other scientific societies of which candidate is a member:

In the space provided state your interest in wanting to join the Society:

5. **SPECIAL CONSIDERATION** – Include any other contributions (Administrative, university, national service, awards and honors) that may be important to physiology.

6. **DESCRIBE YOUR RESEARCH** – What percent of your time/effort is spent in research?_____

Describe the fundamental physiologic questions in your research and how you have answered these questions. Limit the paragraph to the space provided.

7. **BIBLIOGRAPHY** – Attach a list of your publications under the following categories:
   1. Complete physiological papers, published or accepted for publication.
   2. Physiological abstracts (limit to ½ page).
   3. Other papers not primarily physiological (limit to ½ page).

The entire bibliography should not exceed 2 pages. Give complete titles and journal references with inclusive pagination. Use the bibliographic form found in the Society's journals. List authors in the order in which they appear in the publication.

APPLICANT'S LAST NAME _____

3. **DESCRIBE YOUR PHYSIOLOGICAL TEACHING** – What percent of your time/effort is spent in teaching Physiology?_____

Describe in the space provided your teaching of physiology including course descriptions (content, format); supervision of pre-doctoral and post-doctoral students; special contributions (films, textbooks, etc.).

4. **INTEREST IN THE SOCIETY** – List any APS Meetings attended by date and check the appropriate box for any papers.

SPRING (FASEB)			FALL (APS)		
Date	Presented	Coauthor	Date	Presented	Coauthor
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐
_____	☐	☐	_____	☐	☐

List other scientific societies of which candidate is a member:

In the space provided state your interest in wanting to join the Society:

5. **SPECIAL CONSIDERATION** – Include any other contributions (Administrative, university, national service, awards and honors) that may be important to physiology.

6. **DESCRIBE YOUR RESEARCH** – What percent of your time/effort is spent in research?_____

Describe the fundamental physiologic questions in your research and how you have answered these questions. Limit the paragraph to the space provided.

7. **BIBLIOGRAPHY** – Attach a list of your publications under the following categories:
   1. Complete physiological papers, published or accepted for publication.
   2. Physiological abstracts (limit to ½ page).
   3. Other papers not primarily physiological (limit to ½ page).

The entire bibliography should not exceed 2 pages. Give complete titles and journal references with inclusive pagination. Use the bibliographic form found in the Society's journals. List authors in the order in which they appear in the publication.

COUNCIL OF ACADEMIC SOCIETIES BRIEF

ASSOCIATION OF AMERICAN MEDICAL COLLEGES • 1 DUPONT CIRCLE NW • WASHINGTON DC
(202) 466-5100 FALL, 1977 VOL. 3, NO. 1

BIOMEDICAL RESEARCH AND RESEARCH TRAINING TASK FORCE. In anticipation of extensive Congressional review of biomedical research and research training authorities during the next legislative session, AAMC has appointed an ad hoc task force to assess and develop policy statements on issues of importance to the academic and scientific communities.

Membership. The task force is headed by CAS Chairman-Elect, Robert M. Berne, M.D., Chairman of Physiology at the University of Virginia. Task Force members representing the AAMC Council of Deans and the AAMC Council of Teaching Hospitals are Theodore Cooper, M.D., Ph.D., Dean, Cornell University Medical School (COD) and Charles A. Sanders, M.D., Director of the Massachusetts General Hospital (COTH). In addition to the chairman, other CAS representatives to the task force include Philip R. Dodge, M.D., Chairman of Pediatrics, Washington University; Harlyn Halvorson, M.D., Director, Rosenstiel Basic Research Center, Brandeis University; David B. Skinner, M.D., Chairman of Surgery, University of Chicago; Samuel O. Thier, M.D., Chairman of Internal Medicine, Yale University; and Peter C. Whybrow, M.B., B.S., Chairman of Psychiatry, Dartmouth.

Timetable. The panel met in early October to study and update previous AAMC policy papers, identify new research policy issues, and develop an issues-and-options paper. After November task force review, the paper will be distributed to the CAS, providing member societies the opportunity to examine it thoroughly prior to the January interim meeting. The task force's final report will be presented to all AAMC councils in March 1978.

For a synopsis of the issues facing the task force, contact Thomas E. Morgan, M.D., Director, AAMC Division of Biomedical Research.

MOVEMENT FOR UPGRADING GRADUATE MEDICAL EDUCATION. A demand for improvement in policies and procedures of review and accreditation in graduate medical education has been on the increase during the past year. Several of the sponsoring organizations of the Liaison Committee on Graduate Medical Education (LCGME), including the AAMC, have concluded that significant headway can be made only if the Residency Review Committees (RRCs) and the LCGME are provided a staff which serves these bodies exclusively and is not subject to the policies of the American Medical Association, which currently provides staffing. The American Board of Medical Specialties (ABMS), at its September meeting, voted to work toward the development of such an independent staff. The ABMS action was subsequently supported by the RRC chairmen.

Simply developing an independent staff for the RRCs and LCGME will not meet the expectations of the certifying boards and the specialty organizations. Both request an upgrading in quality of standards for graduate medical education and of the review process itself so that marginal programs that do not fully meet the quality standards will be eliminated. A new set of General Requirements of the "Essentials of Graduate Medical Education," in draft and currently being circulated for comment, moves in this direction. These General Requirements emphasize the commitment that institutions which sponsor graduate medical education programs must make to assure that their educational responsibilities are met. During the coming year, the movement toward a major reorganization of the accreditation system for graduate medical education will continue to grow.

For a copy of the General Requirements draft, contact August G. Swanson, M.D., Director, AAMC Department of Academic Affairs.

RECOMBINANT DNA RESEARCH LEGISLATION. Seldom in recent years has the biomedical community shown such concern and concentrated action over legislation as it has over the bills which would regulate recombinant DNA research. The Senate bill (S.1217), sponsored by Senator Edward M. Kennedy (D-MASS.), was reported to the Senate floor on July 22. On August 2, Senator Gaylord Nelson (D-WIS.) introduced "an amendment in the nature of a substitute" to S.1217 which is decidedly preferable to the heavy-handed regulation of S.1217, differs from it on a number of major issues, and is believed to have the unofficial endorsement of the NIH. The AAMC, the American Society of Microbiology, and other organizations with unprecedented support of the scientific community contacted every senator to urge support for the Nelson substitute. At this time, Mr. Kennedy has withdrawn S.1217, and the House bill (HR.7897) appears stalled in committee. We will continue our efforts to impress upon the Congress the concerns of scientists until the issue is finally resolved.

AAMC/CAS ANNUAL MEETING. The CAS holds its 11th annual meeting in conjunction with the AAMC's 88th annual meeting November 5-10 at the Washington Hilton Hotel, Washington, D.C. Special CAS sessions are November 7-9.

- CAS/COD/COTH will jointly sponsor sessions on "Challenges in Graduate Medical Education" Tuesday afternoon, November 8, and Wednesday morning, November 9.

- The CAS business meeting is scheduled for Monday afternoon, November 7. Donald Kennedy, Ph.D., Commissioner of the Food and Drug Administration, will discuss the relationship between the FDA and academic medical centers.

THE GOVERNMENT GIVETH AND THE GOVERNMENT TAKETH AWAY. For many years the first $3600 of research training awards--both direct fellowships and training grants--have been excludable as income for tax purposes. In January 1977, the Internal Revenue Service ruled informally that such awards were fully taxable. The AAMC, through its legal counsel, protested this ruling to no avail, and the IRS has now issued a formal ruling consistent with its former position.

At the same time, the legislative authority lapsed for excluding from taxable income medical student scholarships received under the National Health Service Corps and Armed Forces programs. The result is that these awards are taxable for any student first receiving one after January 1, 1977. Several Congressmen have expressed interest in providing legislative relief for these problems. AAMC will pursue this matter vigorously.

The CAS Brief is prepared by the staff of the AAMC's Council of Academic Societies and is distributed through the auspices of your member society.

IMPORTANCE OF LUNG MATERIAL PROPERTIES IN RESPIRATORY SYSTEM MECHANICS*

Joseph R. Rodarte, M.D.
Mayo Clinic and Mayo Foundation
Rochester, Minnesota 55901

Introduction

It has long been recognized that one portion of the lung is influenced by adjacent regions. The term "interdependence" has been coined to reflect this lack of independence of the mechanical behavior of adjacent regions (13). In the broadest sense of the term, interdependence is applicable to any situation in which there is nonuniform deformation of the lung.

Nonuniform deformation of lung parenchyma occurs if the pressure-volume relationships of intraparenchymal bronchi and blood vessels differ from those of the lung. At a fixed lung volume, when bronchi change their diameter because of changes in bronchomotor tone or of dynamic compression during maximal flow, the parenchyma surrounding the bronchi and coupled to them is deformed locally. Interdependence between the parenchyma and the bronchi may have an important effect on airway compliance and thus on maximal flow.

In the model proposed by Milic-Emili and his associates, (10, 15) regional lung volume at any given height is determined by the local pleural pressure. This analysis does not consider interdependence between regions that have different degrees of expansion. Although this model cannot be literally correct, most studies of regional lung volume are, in general, consistent with this model, and its contribution could scarcely be overstated. Recently, however, interesting data have supported a slightly different premise – that the vertical gradient in pleural pressure is a reflection of, rather than the cause of, nonuniform lung expansion. The vertical gradients of lung volume and pleural pressure reflect the nonuniform lung expansion required for the lung and thoracic cavity shapes to conform to each other (6, 7, 16-19).

How then can these problems of nonuniform lung deformation be approached quantitatively? Engineering mechanics provides a concise description of the mechanical behavior of materials and a method for determining relationships between parameters of a mechanical system and for predicting mechanical behavior of the system under various conditions. If engineering mechanics can be applied to the lung, it should provide a concise description of the mechanical interactions known as interdependence.

These methods were developed for materials different from biologic materials, which have a nonuniform structure. However, engineering materials such as steel and rubber are also nonuniform on the microscopic or submicroscopic level, and yet when averaged over a volume that is large compared with the volume of the nonuniformities, the behavior of these materials can be considered homogeneous (or uniform) and isotropic – that is, independent of direction. Thus, if averages are taken over a volume that is large relative to the individual constituents, such as alveoli, then these methods may be applicable to the lung.

For the last few years, our group has studied the nonuniform deformation of isolated lobes. If a relatively small perturbation from an initial state is considered, the lung may be modeled as an isotropic, homogeneous material whose properties are a function of the initial state. This is analogous to determining lung compliance and resistance as constants that are dependent on lung volume and volume history. Our group has had encouraging success in using data obtained from one type of deformation to predict relationships in another deformation. I will not review these results but will present some simple examples of the mechanical behavior of material with the properties of lung parenchyma. I am indebted to my colleagues Ted Wilson and Steve Lai-Fook for most of my understanding of these arcane matters and also for helping with the examples that follow. Because linear analysis is employed in these examples, the results are quantitatively accurate only for small deformations, and the values shown in the figures are intended to illustrate qualitative relationships.

Definitions of Elastic Constants

Any analysis of nonuniform deformation requires more information than is available from a test of the uniform deformation, such as a pressure-volume curve. All deformations can be considered as having two components.

One type is a change in volume without a change in shape (Fig. 1). This deformation defines one of two independent constants that are required for linear elasticity analysis. An object is subjected to a uniform change in surface stress that changes the volume. The bulk modulus, K, is defined by the relationship between the uniform stress and the fractional volume change. In more familiar terms, the bulk modulus is the specific elastance of the material.

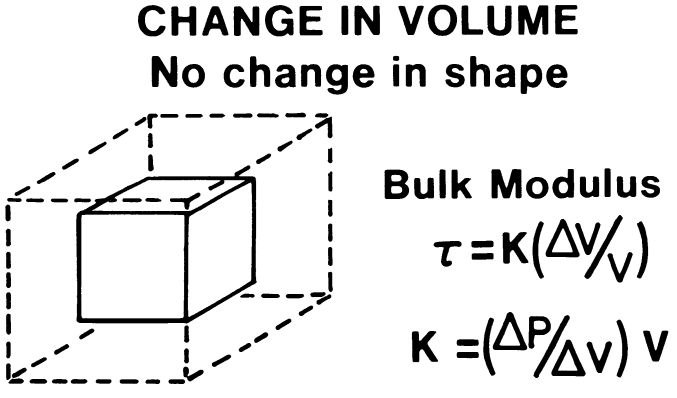


Fig. 1. Change in volume with no change in shape.

A second type of deformation is a change in shape without a change in volume (Fig. 2). For example, the object is deformed, such that its cross section changes from a square to a parallelogram. The shear modulus, μ, is defined as the relationship between the shear stress applied to the upper and lower surfaces of the object and the ratio $\triangle/L$, which is proportional to the angular displacement of the vertical sides.

*Read at the Respiratory Mechanics Session at the meeting of the Federation of American Societies for Experimental Biology, Chicago, April 3 to 8, 1977.

This investigation was supported in part by Pulmonary Academic Award HL-70816 from the National Institutes of Health, Public Health Service.

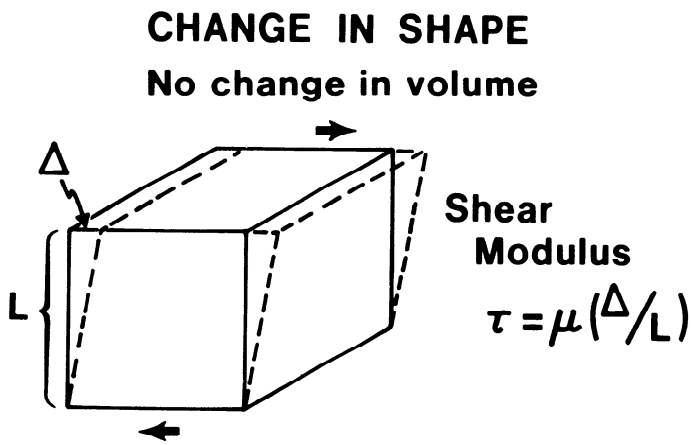


Fig. 2. Change in shape with no change in volume.

All other deformations can be considered as combinations of these two types. The two moduli, the bulk modulus and the shear modulus, are all that are required to describe the mechanical properties of the material and to predict its behavior under other types of deformation. In engineering practice, other deformations may be employed in testing materials, and other moduli have been defined, but only two are independent, and if two are known, the others can be computed.

A commonly used test is that of uniaxial deformation (Fig. 3). If a cylinder is subjected to a stress parallel to its long axis, it will get longer and thinner. This deformation defines two additional moduli. The Young modulus, E, is defined by the relationship between the axial stress, τ_{zz}, and the fractional elongation of the cylinder, $\frac{\Delta L}{L}$. The Poisson ration, σ, is the fractional change in diameter of the cylinder relative to the fractional elongation of the cylinder. In real-life materials, the Poisson ratio ranges between 0 and 0.5.

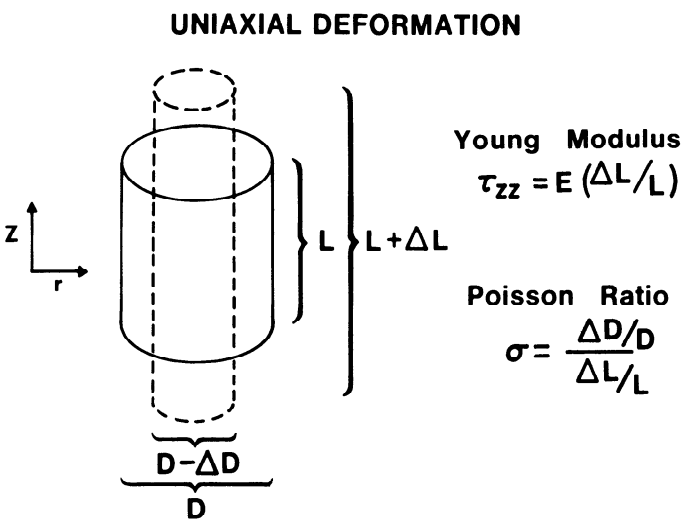


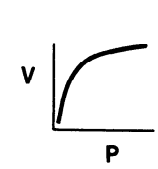
Fig. 3. Uniaxial deformation.

A solid material with a low shear modulus is fluid-like in that it offers little resistance to changes in shape, but changes in shape cause little change in volume, because the Poisson ratio approaches 0.5 and elongation in one direction is balanced by contraction in other directions. These properties are independent of the bulk modulus, or pressure-volume behavior, and must be determined separately.

Elastic Constants of the Lung

Two sets of reasonable values of these moduli for an air-filled lung at FRC are shown in Figure 4. If the volume is 4 liters and the compliance is 0.2 L/cm H_2O, then the bulk modulus, K, is 20 cm H_2O. Both materials have the same pressure-volume curve and a bulk modulus of 20, yet each is different in that the shear modulus of material A is one-third that of material B. Given these two values, the Young modulus and the Poisson ratio can be computed. The Young modulus also differs by a factor of nearly 3. Under conditions of uniaxial stress, material A increases its length by three times as much as material B. The difference in the Poisson ratio is much less.

MATERIAL PROPERTIES OF LUNG PARENCHYMA



	A	B
Bulk modulus K	20 cm H_2O	20 cm H_2O
Shear modulus μ	3.0 cm H_2O	9.5 cm H_2O
Young modulus E	8.6 cm H_2O	24.6 cm H_2O
Poisson ratio σ	0.43	0.30

Fig. 4. Material properties of lung parenchyma.

These material properties are not arbitrarily chosen. The properties of material A are the values that we have determined for isolated lobes at an inflation pressure of 5 cm H_2O (11). The properties of material B are similar to the properties predicted from the purely analytic models of Lambert and Wilson (12) and measured by Hoppin and his associates (9). These properties are also similar to those used by West and Matthews (20) in their modeling of lung deformation. The subsequent examples demonstrate the effect of this difference in shear modulus on mechanical behavior.

Deformations of Physiologic Interest

Nonuniform Deformation With Uniform Regional Volumes. —A special case of uniaxial deformation is that of a cylindrical body inside a regid container of the same diameter (Fig. 5). In this situation, the material is elongated by a uniform stress, τ_{zz}, applied to the ends. The cylinder is prevented from decreasing its radius by an outwardly directed stress, τ_{rr}, because of the coupling between the cylinder and the container. The radial stress, τ_{rr}, which prevents the radial contraction, is smaller than the axial stress, τ_{zz}, which is required to produce elongation. The relative magnitudes of the axial and radial stresses to each other and to the volume change depend on the material properties, as shown on the right of Figure 5.

The y-axis represents the fractional volume change, and the x-axis represents the stress in cm H_2O. For a given increase in volume, the axial stress for material A is shown by line Aτ_{zz}, and the radial stress produced is shown by line Aτ_{rr}.

The radial stress is three-fourths the axial stress. For material B, the axial stress for a given volume change is shown by line $B\tau_{zz}$ and the radial stress by line $B\tau_{rr}$. The radial stress is less than half (42%) of the axial stress.

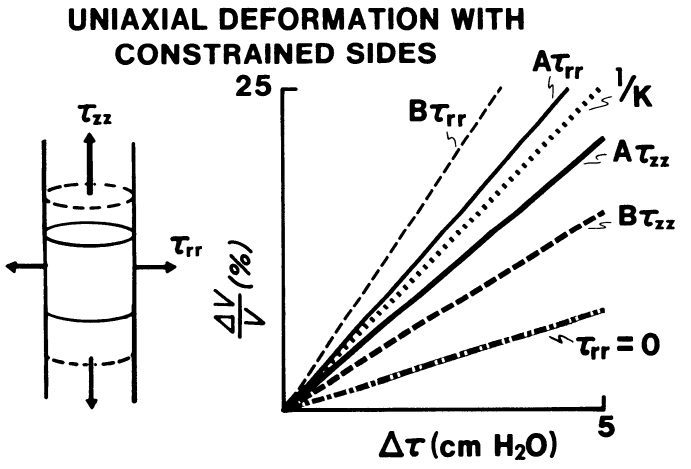


Fig. 5. Uniaxial deformation with constrained sides.

For comparison purposes, the relationship of volume change to axial stress for uniaxial deformation, when the sides are *not* constrained, is shown by line $\tau_{rr} = 0$. Although material A has only about one-third the volume change of material B for a given length change, only about one-third as much stress is required to produce the change in length. Therefore, the relationship of volume to axial stress for materials A and B is identical.

The pressure-volume relationship during uniform inflation is shown by line 1/K. Compliance or pressure-volume behavior is defined only for uniform volume changes. However, if we thought we were dealing with a uniform deformation and measured volume and radial stress, for material A we would overestimate the compliance by slightly over 11%, as indicated by the difference in slopes of line $A\tau_{rr}$ and lines 1/K. For material B, we would overestimate the compliance by 46%. Similarly, if we could measure the volume change and axial stress but did not recognize that this was a nonuniform deformation, we would underestimate the compliance by 17% for material A and 39% for material B.

The error in estimating compliance during nonuniform deformation is relatively small if the lung is fluid-like because of a low shear modulus and is increased markedly if the shear modulus is relatively high. If one were contrasting two patterns of ventilation in which the geometry of lung deformation is different, for example, mechanical ventilation compared with electrophrenic stimulation, the observed pleural pressure changes at a particular site might be different for a given volume change. Similarly, the effect of anesthesia, muscle paralysis, and passive inflation on the pressure-volume curve of the human lung (21) may reflect in part differences in the pattern of regional lung expansion, in addition to the usually cited changes in the surface tension of the alveolar lining.

Uniaxial deformations do not produce a nonuniform distribution of internal volume or a gradient in stress over a surface, even though there are different stresses on different surfaces. The difficulty in changing the vertical gradient in regional lung volumes in man (8) by voluntarily changing abdominal and thoracic cavity volumes may reflect in part a relatively low shear modulus of the lung, but also this change of shape may be one that produces very little change in the gradient in internal volumes.

Vertical Gradients in Regional Volumes.—The next examples are concerned with mechanisms that produce vertical gradients of volume and pressure. In the two preceding examples, gravity was not considered, yet gravity must be an important factor. In the absence of gravitational force, most of the nonuniformities of ventilation in man are abolished, (14) yet the mechanism by which gravity determines nonuniform regional ventilation is not clear. Observations by Agostoni and his associates (1-4) suggest that the predominant gravitational effect is on the chest wall and not on the lung parenchyma. However, nonuniform ventilation occurs in isolated lungs and lobes with a uniform pleural pressure. Therefore, gravity must have some direct effect on regional parenchymal expansion.

The gravitational deformation of a cylindrical body constrained within a rigid container of the same size and shape is shown in Figure 6. The deformation in this situation, in which the external shape is constant, is much less than if the material was not constrained. Even though the external shape is not changed, there is a vertical gradient in regional volume, as the upper portion of the material is pulled downward by the weight of the material below it, and the lower portion is compressed by the weight of the material above it. The axial extension of the upper region tends to decrease the radius, and an outwardly directed radial stress is required to maintain the constant shape. Dependent regions are compressed by the weight above them and tend to expand in the radial direction. A compressive stress is required to prevent this bulging.

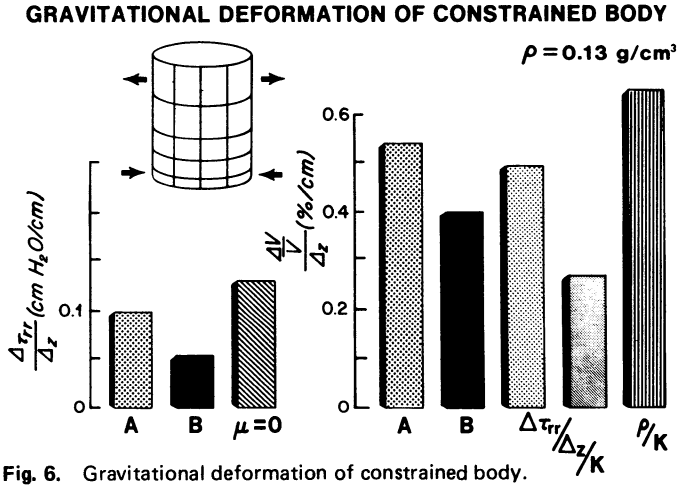


Fig. 6. Gravitational deformation of constrained body.

The gradients in radial stress for materials A and B, assuming a density of 0.13 g/cm (3), are shown in the left panel of Figure 6. For material A, the gradient is about 0.1 cm H_2O/cm. For material B, the gradient is approximately one-half that of material A. If the shear modulus were at 0 ($\mu = 0$), that is, if the material were a fluid, the gradient in surface stress would be hydrostatic or equal to the density of the material, 0.13 cm H_2O/cm.

The vertical gradients of regional volumes for the two materials are shown in the right panel of Figure 6. Material A has a gradient of 0.54% of the undeformed volume/cm, and material B has a gradient of 0.40 %/cm. Bar $\Delta\tau_{rr}/\Delta_z/K$ shows the vertical gradient of regional volume that would be predicted from the pressure-volume curve of the materials and the regional stresses. For each material, this is less than the actual gradient, 10% less for material A and 32% less for material B. Bar ρ/K shows the vertical gradient of regional volume that would be computed from a hydrostatic pressure gradient and the pressure-volume curve. In this example, the vertical gra-

dient of radial stress is less than that reported in experimental animals, and the vertical gradient in regional volumes is less than that reported at FRC in man.

The effect of a change in shape (ignoring for the moment the gravitational effect) is shown in Figure 7. In this example, a cylinder is in a container of the same size and shape.* The sides of the container are rotated by an angle α. This deformation results in a vertical gradient of both radial stress and regional volume, the magnitudes of which depend on the properties of the deformed material. The left panel of Figure 7 shows that for a 1.5° rotation of the sides, the vertical gradient of radial stress for material A is approximately 0.05 cm H_2O/cm and for material B, it is 0.14 cm H_2O/cm. Thus, material A, with the low shear modulus, is less influenced by an imposed change in external shape than is material B, although material A is influenced more by the gravitational field. For reference, the vertical gradients in radial stress due to gravity for the two materials are indicated by the hatched bars.

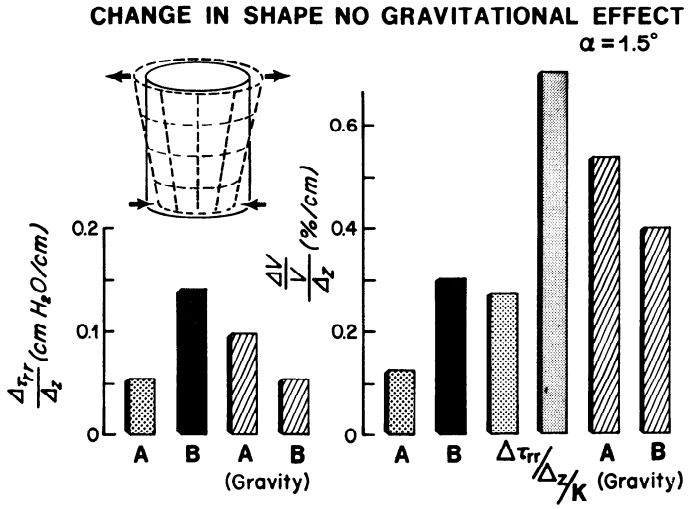


Fig. 7. Change in shape with no gravitational effect.

The vertical gradient in regional volume for an angular deformation of 1.5° is shown in the right panel of Figure 7. For material A, the gradient of regional volumes is 0.13 %/cm and for material B 0.3 %/cm. Bars $\triangle\tau_{rr}/\triangle_z/K$ indicate the vertical gradient in regional volumes that would be predicted from the regional stress and the pressure-volume curve. This is a substantial overestimate of the actual gradient in regional volumes. The hatched bars show the vertical gradient in regional volume for the gravitational deformation. Again, there is a discrepancy between the relative effect of externally imposed shape change and the gravitational loading on materials A and B.

A final example is that of the combined effects of an imposed change in shape and gravitational distortion (Fig. 8). In this example, the angular deformation necessary to cause a vertical gradient in radial stress of 0.25 cm H_2O/cm was computed. For material A (left panel), slightly more than 4° is required to produce this net gradient in stress. Material B, which is only half as susceptible to gravitational effect but nearly three times as susceptible to an externally imposed deformation, requires only about half the angular deformation of material A.

*Both the deformation and the pressure gradient depend on radius (are proportional to α/r); r = 10 cm for these examples. Solution is not exact but is close approximation.

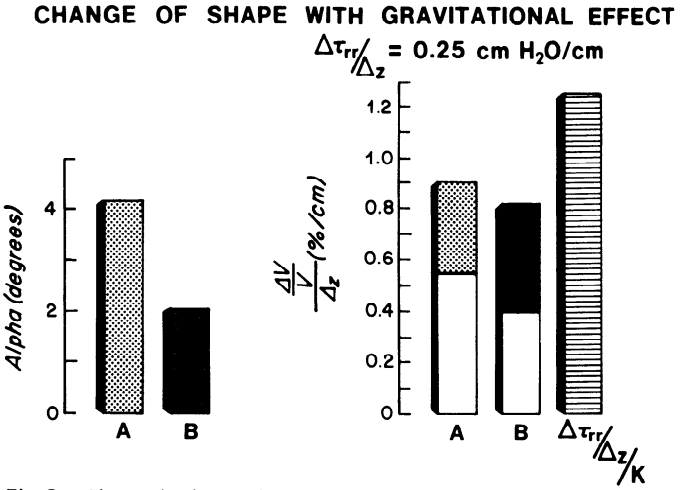


Fig. 8. Change in shape with gravitational effect.

The right panel in Figure 8 indicates the vertical gradients in regional volume that occur when a gradient of 0.25 cm H_2O/cm in radial surface pressure is a result of the combined gravitational effect and an externally imposed deformation. Material A has a vertical gradient of 0.9 %/cm. The volume gradient of material A due to gravity is indicated by the unstippled lower portion of the bar. Although regional volumes of material B are more influenced by externally imposed shape change, the shape change required to achieve the vertical gradient of pressure is less, such that the resulting gradient in regional volume is similar for the two materials. Again, the gradient in volume attributable to gravitational deformation is indicated by the unstippled lower portion of the bar. The vertical gradient in regional volumes that can be predicted from a gradient of 0.25 cm H_2O/cm in stress and the pressure-volume curve is indicated by bar $\triangle\tau_{rr}/\triangle A_z/K$. These computations ignore the dependence of material properties on lung volume and thus tend to underestimate the volume gradient.

Effect of Interlobar Fissures

Another factor that has not been considered in these examples is the effect of interlobar fissures. Our group has been studying regional lung expansion in the dog by determining the location of intraparenchymal metallic markers roentgenographically, and we have found that the lobes shift their relative positions. This shifting suggests that the lung parenchyma may be less deformed than would be predicted from overall changes in the shape of the thoracic cavity. Thus, slippage along intralobar fissures may reduce the nonuniform ventilation that might otherwise occur. In man, radiographically minimal pleural disease has been reported to be associated with rather striking derangements in the regional distribution of ventilation determined by ^{133}Xe (5). Although other explanations must be considered, pleural adhesions preventing the slippage of lobes relative to each other and the chest wall, is probably a factor in the abnormal ventilation distribution.

Conclusions

Although the results of this simple analysis are not quantitatively accurate for large deformations, the examples do illustrate certain important points. First, regional ventilation

and bronchial-parenchymal and vascular-parenchymal interdependence and interdependence between lung regions with obstructed airways and the surrounding lung parenchyma or the chest wall are problems of nonuniform lung deformation. Second, failure to demonstrate a change in regional volume distribution when thoracic cavity shape is altered does not necessarily mean that nonuniform volume distribution is not predominantly determined by thoracic cavity shape; some changes of shape do not affect the distribution of regional volume. Third, the relationship between regional volume and local surface pressure depends on the actual deformation of the lung. Fourth, a quantitative approach to any situation involving a nonuniform deformation of the lung requires a description of lung mechanical behavior beyond that which can be obtained from the pressure-volume curve.

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SYMPOSIUM ON TOXICOLOGY, DRUGS AND POLLUTANTS

A medical symposium, "Clinical Toxicology, Pharmacology and Carcinogenic Hazards," will be presented in San Francisco on December 9-11, 1977, by University of California Extension, Berkeley, in cooperation with Continuing Education, UC School of Medicine, San Francisco.

The symposium is planned to update information relating to drug toxicology, clinical pharmacology, and drug and chemical environmental hazards. Highlighted will be techniques for identifying drug overdoses and monitoring drugs and metabolites that are being used therapeutically. Attention will be given to drug interferences with laboratory tests, the current status of testing for environmental pollutants, and the carcinogenic hazards of drugs and chemicals. Extraction and separation methods will be featured, with an overview of procedures ranging from gas chromatography and mass spectrometry to radioimmunoassay and enzyme immunoassay. Problem solving in interpretation of analyses, community drug programs and identifications of street drugs will be discussed, as will the effects of drugs on the liver and on kidney metabolism.

A complete symposia program and information about registration procedures may be obtained by writing to Medical Symposia, Division of Letters and Sciences, University of California Extension, Berkeley, CA 94720 or call (415) 642-1061.

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History of the Department of Physiology at Southern Illinois University

Harold M. Kaplan

Only a handful of Physiology departments have existed in this country in Universities in undergraduate and graduate programs which are not associated with medical, dental, veterinary medical or other similar professional training. The number seems destined to decrease practically to zero, partly because interdisciplinary goals are stressed and are generally thought to be better attained in comprehensive departments of biological science and partly because fractionation of biology to separate subdisciplines is just too costly, and especially so in the small, private institutions.

The educational climate in the larger state universities in Illinois was for many years especially favorable to the establishment of diverse programs maximizing the offerings to the undergraduate, graduate and preprofessional student. Support from the legislature was excellent and there was no central superboard which could evaluate the cost of new programs or to determine whether it was desirable to duplicate programs already available at one of the state universities.

It was in such a climate that the Department of Physiology was founded. In 1947, Southern Illinois University was beginning a remarkable growth, emerging from a teacher's college to a full-fledged university, with the full support of the state legislature. A Department of Physiology had long existed on the Urbana campus of the University of Illinois and S.I.U. could thus claim an equal right to expand its offerings. What was more, it had a well-established model at Urbana from which it could learn.

In 1947, Dr. Marie Hinrichs, physiologist and physician, and then director of the Health Service at S.I.U., established a course in Introductory Physiology and another in Advanced Mammalian Physiology, and she enlisted the help of another local physiologist-physician, Dr. Eli Borkon, to help in these endeavors. The courses were received favorably, gathering an audience from the premedical and paramedical students, especially. Peripheral and somewhat unusual courses, such as medical technology and pathology, were added to the offerings, and taught by a local pathologist, Dr. Fred Bornstein.

The concept of a Department of Physiology became firm. Due to the primary clinical demands upon the part-time instructional staff, it was obvious that a full-time professional physiologist was necessary. In 1949, the writer of this history, Dr. Harold M. Kaplan, was invited to Carbondale from the University of Massachusetts and asked if he would assume the task of organizing a Department, within the College of Liberal Arts and Sciences.

The task was not easy. Existing courses had to be greatly revised and others eliminated to fit the Department into a framework of general education rather than presenting it as a springboard which previewed material taught in a medical school. Elimination of courses such as pathology and medical technology raised sharp objections that had to be adjudicated by the University President. The fact that the Department might come under the scrutiny of the North Central Accreditation agency if it were to be an acceptable program for undergraduate education and not for professional training brought all parties to the realization that the proposed Department had to fit into the general liberal arts concept. The Administration then formally approved the program as a Department in 1949. Dr. Hinrichs maintained a supervisory capacity in the early weeks of the formative development. Dr. Kaplan was given a free hand to develop a curriculum and, in actual practice, was the instructional staff.

Within a month or so of the formation of the Department, Dr. Hinrichs, in finding it impossible to have the Administration approve a very competent physician and scholar as a part-time instructor, resigned from the faculty to accept an attractive post at the University of Illinois in Urbana. Dr. Kaplan, without authorization to obtain essential staff, had to assume all duties including the administration of the Department in addition to teaching the existing course offerings. Dr. Kaplan was appointed Acting Chairman within two months of his arrival and a short time later was fortunate enough to convince Dr. Borkon to accept an Adjunct Professorship. This title carried no salary, but on the books the Department staff had increased a respectable 100 per cent and it had two physiologists.

Within four years, the Department had grown to three full-time physiologists (Dr. Frank Finamore and Dr. Gabriel Rapatz had joined our staff), plus the Adjunct Professor. It was firmly established and had the enthusiastic support of the Administration. Because of a vacuum concerning where to teach Anatomy, for the Department of Physical Education first and a developing Department of Nursing next, the Department of Physiology was asked to add two specialized courses in that discipline. Then at the urging of the Department of Nursing, a course in human dissection, unique as an undergraduate offering, was established. The Department had become in practice, although not in name, a Department of Anatomy and Physiology. It was later to add a course in the Anatomy and Physiology of Speech to serve the Department of Speech Pathology and Audiology and also to provide anatomy teaching for a Dental Hygiene program and a Department of Mortuary Science located in what is now the School of Technical Careers.

The Department by 1957 felt fully ready despite its small faculty to enter graduate education. Its proposal was accepted by the President and Trustees and, following detailed review by outside consultants, the master's degree program was accredited in 1957. This abruptly accelerated the research productivity of the staff and the Department competed quite favorably with long-standing programs both in and out of the University.

About 1959 the University began reviewing its various internal programs to select those which it thought were most ready for initiating doctoral programs. Physiology, through lack of staff, was not yet eligible. This catalyzed a rapid expansion of the staff and the offerings. By 1960 a vigorous seven-man Department succeeded in gaining internal approval by the Administration, followed quickly by a very favorable review by outside consultants and accreditation by the North Central site visitors. The first Ph.D. degree was granted in 1964. Courses were expanded to include instruction in biophysics, animal surgery, and electron microscopy.

In the early 1970s, student discontent was rising throughout the country. State legislatures were taking a hardening view about the contributions of the Universities and their relationships to the education of their students. Funds became much harder to get. This quickly became reflected in the internal budgets of programs which had become accustomed to expansion and most favorable treatment. Department chairmen were having a difficult time. Dr. Kaplan was advised by the S.I.U. Chancellor that Physiology might be merged with three other programs in biological sciences into a unified Department of Biological Sciences and that no additional staff could be anticipated until this new concept could be evaluated and decisions made. This was in many ways a logical development. In addition to an economy of funding and the elimination of overlapping programs, it could help unify the life sciences. The Department of Physiology appeared to have peaked as a distinct unit of function.

In recent times where change is a way of life, unexpected events alter the evolution of university programs dramatically. About 1971 the Southern Illinois University School of Medicine began its operation, the first year on the Carbondale campus followed by two more calendar years in Springfield. The premise was that existing facilities and staff should be utilized wherever possible, partly as a measure of economy. The Department of Physiology, with its classical linkage to basic medical science, appeared eminently suited to assuming a new role, and this it did. Following the initial activities ensuring liaison, Dr. Kaplan returned after 22 years as chairman to full-time teaching, his duties split between the Department and the Medical School.

The Department currently has almost 25 full-time faculty members, the majority of whom are responsible chiefly to the Medical School but who also give courses to undergraduate and graduate students coming to the Department from many other programs. There are currently about 35 graduate students, all supported by internal funding or through external grants. Our doctoral graduates are all working in the field, scattered in diverse positions throughout the country.

In regard to the present relationships between Department and Medical School, the still short history of the Medical School and its emphasis on the interdisciplinary approach makes it difficult to assess what the future holds. One might conclude with the absolute statement that nothing is forever.

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SYMPOSIUM ON LIPID-CARDIOVASCULAR RELATIONSHIP

"New Frontiers on the Relationships of Lipids, Lipoproteins and the Arterial Wall in Cardiovascular Disease" will be the subject of a medical symposium January 27-29, 1978, in San Francisco. It is presented by University of California Extension, Berkeley, in cooperation with Continuing Education, UC School of Medicine, San Francisco.

The focus of the symposium will be on the current status of testing for lipids and lipoproteins, their importance in clinical medicine, the classification of diseases associated with lipid abnormalities and the importance of high density lipoproteins (HDL) in preventing coronary artery disease. New concepts relating lipids and hormones to proliferation of smooth-muscle cells of the arterial wall will be discussed. Topics will range from new techniques for identifying abnormalities in lipids and lipoproteins to the significance of HDL in long-lived individuals, long-distance runners and persons on vegetarian diets.

For a detailed symposium program with a complete roster of speakers and topics as well as information about registration procedures, write to Medical Symposia, Division of Letters and Sciences, University of California Extension, Berkeley, CA 94720 or call (415) 642-1061.

FIFTEENTH ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM

The Rocky Mountain Bioengineering Symposium will be held April 17-19, 1978 at Iowa State University, Ames, Iowa. It is expected that sessions will include but not be limited to the following topics: Health Care Delivery; Instrumentation; Protheses; Computers in Medicine and Biology; Ecological Applications; Biomedical Systems Analysis.

Abstracts (200 word) should be submitted not later than January 1, 1978. For further information contact: David Carlson, Biomedical Engineering, Iowa State University, Ames Iowa 50011. Phone: (515) 294-6520.

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Paul Reznikoff to Hal Davis:

I have finally retired from active practice and am now living in Woods Hole where I worked years ago with Robert Chambers and his microsurgical technique in the field of cellular physiology at the Marine Biological Laboratory. There is much activity here even in winter with the Woods Hole Oceanographic Institute open all year and the friends we have make this place interesting and delightful.

Dorothy and I are working on an historical project – the history of the New York Hospital (founded in 1771 with a charter from George III) as studied from the minutes of the Board of Governors of the hospital from 1771 onwards. We are also on the Board of the Woods Hole Historical Collectors and enjoy the interesting data which we can study.

Albert Redfield is still living here and is active.

I remember the inspiring group 55 years ago in the C building at Harvard Medical School – Cannon, Forbes, Drinker, Aub, Henderson, Cohen, Ferry, Fairhall, Ann Minot, Alice Hamilton, Katherine Drinker, Redfield and Hal Davis. Also Homer Smith and many who worked a few months in our laboratory like Bill Castle, Joe Wearn, Herman Blumgart, Jacob Fine who became leaders in their fields. I forgot Selig Hecht who was George Wald's teacher.

Several years ago my son, now a bacterial geneticist at the University of Wisconsin, was doing his post-doctoral work at Harvard with Beckwith and he and a colleague were in the C building and were looking at the pictures of the staffs of the Department of Physiology which adorned the walls of the staircase. His friend passed some remark about the rather outlandish appearance of some of the characters, "Say," said my son, "be careful what you are saying. One of that group is my Dad."

Anna Baetjer to Hal:

I am now Professor Emeritus of Environmental Medicine at The Johns Hopkins School of Hygiene where I have been ever since receiving my doctor's degree here under the direction of Dr. William Howell. I still have a research grant, and this fall with the assistance of Bob Rubin published a study on the effects of dehydration on microsomal enzymes metabolism.

Although it might surprise some of the modern environmentalists, this department has from its beginning in 1918 been concerned with the physiological reactions to the environment. My particular interest has centered on the industrial environment, and I continue to teach the course on Occupational Health. Like every other scientist in the environmental field, I serve on a number of government advisory committees.

I guess you might say that I have worked more in applied than in basic physiology. The field of environmental physiology and occupational health is stimulating and even exciting at times. I recommend it to younger physiologists as a challenging area.

My summers are spent hiking in the Canadian Rockies – interspersed with travel abroad. I am glad to hear that you and Bruce are still very active. My best to you.

Hans Ussing to Edward Adolph:

Your letter raised some questions which subconsciously I have been putting off too long. What indeed am I going to do with myself a few years from now? Until I got your letter I had been feeling rather like a scientist in the middle of his career, participating in research, writing articles and books, going to meetings and congresses, teaching and performing administrative chores. But by the end of 1981 at the latest I have to retire from my present post at the University of Copenhagen. Of course much can change in the next few years, but I cannot see myself in the role of a retired person without contact with the scientific world. So in due time I must be on the lookout for a full-time or part-time affiliation with some scientific institution, so that I can continue doing research and scientific writing. Administration, I shall, however, leave behind without regret.

I should like to add two things. First that it was a great pleasure for me to meet you again during my visit to Rochester last year and, secondly, that I am an eager reader of the letters from senior physiologists to *The Physiologist.*

"Shelly" Shelesnyak to Edward:

A few years ago I started as Director of the International Program for Population Analysis. It had three phases: one involved the support of social science research by scholars from developing countries, in those countries, on matters of population dynamics; the second component was the organization and implementation of interdisciplinary workshop/conferences in various parts of the developing world and finally a third part, publishing: a quarterly newsletter (PDQ), annotated bibliographies on selected subjects, proceedings of the workshops. The A.I.D. people who have been sponsoring that program cut the support out from under us and so for the past few hectic months we have been busy closing up that project. Phasing out involved a preparation of the final issue of the Quarterly and editing and printing eight monographs, based on fifty-two research projects.

Thus, as of the first of 1977, the Interdisciplinary Communications Program, which carried out the IPPA, will be turning to other areas of interest; one is the continuation of our conference series on the Philosophy and Technology of Drug Assessment, and the other will be an attempt to study the relationship between communication and productivity. But these matters are not yet entirely firm. I hope within the next several months to have a more clearly defined picture. As you can see, I am trying to continue my scientific activities. In the next letter I trust I will be able to tell you how we are doing.

Since my last note to you I did have the opportunity to turn to earlier work, to become nostalgic and reminisce if you wish. When Drs. Joe Meites, Bernie Donovan and Sam McCann invited me to participate in their book *Pioneers in Neuroendocrinology* by writing "... a personal, and even idiosyncratic, account of the steps taken, and the motivation and drive that led them to develop their interest in the relationship between the brain and the endocrine system" I accepted the challenge and had fun talking about my past.

Samuel E. Pond to Hy Mayerson:

Many thanks for your Birthday Greetings and your cordial note. For myself, I'm well and active, mostly in community enterprises, helping town and country in water quality work, anti-pollution control, with our Watershed District's chain of lakes, improving lakeshore property and wetlands.

My wife and I continue to enjoy our lakeside Bay View camp on Lake Cobbosseecontee, with an abundant winter, nestled on a hillside, having a southern exposure in rural, central Maine. It's a sort of academic environment (Bates, Bowdoin, Colby, Thomas, and two branches of the University of Maine — Augusta and Farmington). Our solar heater and fireplace with wood lot help in winter and the trees in summer.

Glad to hear from Esther Greisheimer and Gene Landis and you to keep in touch with APS et al (Sam's address is P.O. Box 63, E. Winthrop, Maine 04343).

Isaac Starr to Hy:

It was a pleasure to hear from you again on my birthday. There is nothing much of interest to report on my part of the front. I still continue to work regularly at the University Hospital and to publish about two papers a year. I had a presentation at the summer session of the American Physiological Society held here in Philadelphia last August.

The number of grandchildren and great grandchildren remained constant throughout the year. I am glad to hear that all is well with you.

Bob Kehoe replied to a birthday greeting from Bruce:

I was and am greatly pleased by your note of some time ago, despite my failure to respond promptly. The reason for my belated reply lies in the fact that I suffered an atypical cerebral hemorrhage several years ago, and that I have developed recently certain most inconvenient disabilities (cataracts and retinal degenerative changes) which have almost immobilized me. Despite all these defects, I have undertaken to continue such activities as I can and I hope under the ministration of a very competent ophthalmologist to regain such vision as will permit me to contribute services of worth to the Department which I once headed, and which in my retirement, is headed by my dear friend Raymond Suskind, M.D., an excellent dermatologist and also a sound physician in other fields and a thoroughly competent teacher and leader.

My official status in the University of Cincinnati is that of a retired Professor Emeritus of Physiology. My greatest competence and knowledge from experience lies in Occupational Medicine, but Physiology is a remarkably valuable field of that specialty. During approximately thirty-five years of my active profession I undertook to study in some detail the physiologic background of the metabolism of lead administered in completely controlled dosage to adult human subjects. The data of these studies have not been published since I was overtaken by retirement, which, to my surprise now, would seem not to have been anticipated, and I have written and will write more on the outcome and interpretation of the data of those experiments.

I have no dependent children, our only child is now in her forties and is real joy to her parents. She is unmarried and so it is improbable that we shall have grandchildren. Lucille, my wife, despite a laminectomy which did her in for months, and I have a very good life together. The foregoing brief account, epitomizes our lives, without reference to our previous activities. Such things as I have thought about scientifically, are represented in considerable part of my publications, and if, for any reason you find it necessary or desirable to look into them, I'd be pleased to send reprints of all except the last referred to above (not completed).

It has been good and most considerate of you to write and I appreciate it greatly.

Geoffrey Keighley to Bruce Dill:

When I retired from Cal Tech in 1970 I was fortunate to receive an invitation to work at the Jackson Laboratory, where I have continued investigations into erythropoiesis, using some of the many strains of mice available at the Jackson Lab. I have enjoyed working after my formal retirement, and recommend it highly. Some of our younger, unretired colleagues might well consider whether they could take advantage of the inbred and mutant strains of animals now available.

In June I shall be moving to Toronto, Canada, the active part of my career will be about over.

Geoffrey's address after June 1 will be 184 Borden St., Toronto, Ont. M5S 2N3, Canada.

Ann Minot to Hal:

Thank you for your always welcome birthday greetings which arrived exactly on time to add extra frosting to my many-candled birthday cake. I don't know when your birthday is but when it arrives wish yourself a happy birthday for me.

Ernest A. Spiegel to Hal:

Thank you very kindly for your good wishes which I deeply appreciate. Having attempted for over half a century to develop as a specialist, i.e. to know more and more about less and less, I try now in my retirement to learn about developments in other fields.

Hiram Essex to Hal:

It is indeed gratifying to be remembered by those one holds in high esteem! Thanks for your gracious note with birthday greetings. I am approaching the condition of the gentleman who said "I have trouble remembering three things: names, faces and ?? I always forget that third one." I feel like Fred Hitchcock . . He told me when he was about 82, "I never expected to live so long." If one enjoys good health it is great. Mrs. E. and I have a few minor complaints but they don't prevent full enjoyment of living. We enjoy gardening and the fruits thereof. I am still deeply interested in our Holstein herd that is helping provide nature's most nearly perfect food for those city slickers.

It was a great pleasure to be able to share a bit of our invigorating winter weather. So sorry you failed to fully appreciate it. I must admit that it was a bit more than we could appreciate in these parts as well.

Last autumn Marian and I celebrated our 50th wedding anniversary with our three daughters and seven of our twelve grandchildren. We spent a week together at Spirit Lake, Idaho at the summer place of our oldest daughter and her husband, Dr. R. N. Kleaveland.

Thanks again, Hal, for your greeting. As I said it is nice to be remembered and as the man remarked whose picture was displayed in the Post Office, "It is nice to be wanted."

Louis B. Flexner to Hy Mayerson:

I'm still working as a volunteer in my old laboratory on problems of memory, still have pre-doctoral students, still teach histology to a section of medical students, still think I'm a very lucky guy to have these opportunities in a most congenial environment.

I'm glad you are enjoying your "retirement" with freedom from deadlines and reports. For better or worse these things never much bothered me and so I am not pushed by them to follow another path.

Leland C. Wyman to Edward Adolph:

I was certainly surprised and immensely pleased to get your nice birthday letter. It reminded me of the time when we were both graduate students at Harvard, a chapter of what now seems like a very distant past. I had a relative who used to say that he did not mind changing the second digit of his age every year, but when he came to the first digit it always gave him a jolt. However, I do not feel any different than I did two weeks ago, so in my case the jolt was very mild.

I hope you have been enjoying retirement as much as I have, but knowing you I expect you have. I have not been idle, having gotten out five books, with two more now in press since my retirement 15 years ago. They are all, however, on my avocation, Navajo Indian ceremonialism, sandpainting, and so on. My wife and I have also continued to travel rather extensively, but we started that long before I retired. Up to now we have visited 46 different countries, all over Europe, Asia, Africa, etc. Our last trip took in Indonesia, Thailand, Nepal, Northern India and Burma. Although we both are now octogenarians we plan a trip to England and Denmark next summer.

George R. Meneely to Dr. Adolph:

I turned 65 on September 30, 1976, and will step down from the headship of the Department of Physiology and Biophysics at Louisiana State University on July 1, 1977. I will however continue another 5 years as Professor of Physiology and Biophysics and as Professor of Medicine because the academic guideline of this institution is 70 years.

I am continuing with scientific work and the like, especially concerning sodium, potassium and hypertension and also clinical pulmonary physiology. I am changing my relationship with the school in that I will take up again the duties which I performed earlier here as Coordinator of Development of Plans and Programs. I did the functional architectural program for this medical school and I am now engaged in a variety of new projects. We are remodeling our principal teaching hospital and we have 15.5 million dollars to build an addition to it. We need to establish out-reach facilities in some poverty pockets near this city. We will take on another hospital at Monroe, Louisiana, which is about 100 miles away and we will probably build an area health education center there.

I am free to move to another area but it would have to be a pretty attractive offer and it is really unlikely that I would accept one.

While planners are a dime a dozen, it would take someone new here six months or a year to get his feet on the ground, and some of our developmental projects are extremely time urgent. There is one pleasant aspect of being a planner; one has absolutely no authority and absolutely no responsibility.

David E. Goldman to Dr. Adolph:

At the time of my retirement, last July, from the Medical College of Pennsylvania, I was much too busy with relocation and other problems to notice that I had become a "Senior Physiologist." Thank you for bringing it to my attention. My adjustment and resettlement are proceeding nicely. I now carry on part-time research at the Marine Biological Laboratory, Woods Hole, in an intramural biophysics laboratory as a Guest Scientist. I am also involved in such things as writing, consulting, editing and lecturing on a modest scale. I expect my behavior is normal for someone in "active retirement." I retain a somewhat tenuous connection with my prior institution as an emeritus professor.

With respect to your specific inquiries: 1) As you can see I am scientifically active though not on a full time basis; 2) I am not now free to move to another area on a long term basis; 3) I would be interested in temporary work in my field in teaching, research or administration; 4) I have nothing to offer in the way of news items or wise observations. Maybe in the future.

Harold H. Cole to Dr. Adolph:

Thank you for the congratulatory message for the committee on Senior Physiologists on my 80th birthday. The occasion did provide an incentive to put together some of the historical background of instruction in physiology on the Davis campus to present to the graduate students in physiology.

Walter Wilde to Hy:

Richard Ashman showed us the glistening white beaches of West Florida during my first week at LSU, New Orleans, 1939. We often returned to Fort Walton Beach from Tulane. Five winter vacations from Ann Arbor weather induced us to retire here in Naples, Florida. Our many sliding doors overlook our waterway. From my desk I see our small boat that takes us through miles of mangrove lagoons. We stroll 280 yards to the Gulf where I swim 2000 feet daily while Mary walks the beach shelling. Blood pressure 138/85.

Physiology is an excellent background for coping with this dry and tropical environment. I am consultant to my neighbors on plumbing, insects, and medicine. My life-long interest in meteorology is paying off. After a 16 weeks' course I am a "weather specialist" in Coast Guard Auxiliary and teach weather for safe boating courses. Our inland heat convection showers provide a spectacular laboratory and give us cooling sea and land breezes. It is amazing how dry the coastal ridge and aquifier can be. City wells are drying up and we must begin to pipe water from inland.

Amongst all these problems one cannot lie fallow. Last December I became President of the Vanderbilt Beach Property Owners' Association. My "kingdom" includes 215 homes lying on waterways. I often plead before the Collier County Board of Commissioners. The County Commission is a powerful governing body in the South. Two commissioners and dozens of members on advisory councils are elite retirees.

Professor **Archibald Vivian Hill,** APS Honorary Member, "AV" to most of his colleagues, died June 3 at the age of 90. He was the first Nobel Laureate in Physiology from Great Britain. Hill began his training as a mathematician but turned to another science wherein this training would not be wasted. He chose physiology and began with a modification of Nernst's theory of excitation. It was suggested to him that he investigate the heat production of muscles during activity. After a tour of German laboratories in 1911, he began the research on the heat evolution of muscle and nerve which became his life's work and eventually led to his sharing the Nobel Prize for Physiology and Medicine for 1923 with Otto Meyerhof, of Kiel. After WWI, Hill was Professor of Physiology at Manchester and in 1923 was appointed Professor at University College, London. In 1926 he was made Foulerton Professor of the Royal Society at University College, where he remained until his retirement in 1951. He served in various consultative positions to the British Government and even served as a Member of Parliament for the University of Cambridge from 1940-1945. He held many honorary posts and received many honorary degrees from many countries.

The Society was notified of the death of **Edgar C. Adrian,** honorary member. Lord Adrian was former professor and chancellor, Cambridge University. He died on August 4 at the age of 87.

A Service of Thanksgiving for Lord Adrian was held in Westminster Abbey on October 18, 1977. The address was delivered by Sir Alan Hodgkin.

Sydney W. Britton died on February 15, nine days before his 85th birthday. Dr. Britton developed a new theory of evolution during his 24 years as Chairman of Physiology at the University of Virginia School of Medicine. He received his B.S. and M.D. at McGill University and later studied at Harvard Medical School where he worked with Dr. Walter B. Cannon. He became best known for his work on the adrenal gland and with monkeys, sloths and primitive animals.

In a letter to Dr. Bruce Dill, his wife Louise said, "Sydney and I had over 50 years together, and they were so filled with gay, high-spirited, adventurous activities, along with dedicated hard work, that his passing leaves an immeasurable gap."

FONDATION DE PHYSIOPATHOLOGIE

According to the wishes of its founder, the "Fondation de Physiopathologie Professeur Lucien Dautrebande" will grant a prize every three years. This is an international prize aiming to reward an author, or several authors who have been since a long time associated, for a work of human or animal clinical physiopathology preferably involving therapeutic implications. Its purpose is to allow the holders to continue investigations which are enough advanced to deserve substantial help or reward.

The candidate will send, to the seat of the Foundation, three copies of:

1) His curriculum vitae; 2) the list of his publications. Of this list, the candidate has to point out 20 publications which he thinks to be the most representative of his scientific work. 3) the different papers, published or not, composing this work. 4) a short summary of his scientific work.

This prize will be awarded, for the next time, in the course of 1979.

Applications should be sent before December 15, 1978 to the seat of the Foundation: 35, chaussee de Liege 5200 HUY (Belgium). They must be presented by two personalities, who are ordinary or associate members of National Academies, Professors of Universities or considered as such, or previous holders of the prize, and who will sign together.

Applications made by persons requesting the prize for themselves will not be considered. The works or summaries will be written in an international language. The prize will not be awarded to a candidate who would have been granted an important prize in the five previous years.

For further information write to: Dr. J. Stalport, 35, chaussee de Liege 5200 HUY (Belgium).

DR. BRUCE DILL SUBMITTED THE FOLLOWING STORY

Return to High Altitudes

In August 1977 three of my young colleagues helped me assess my physiological responses to high altitude. Fifteen years earlier such a study was carried out on six members of the International High Altitude Expedition to Chile in 1935. A brief account, *Reunion at High Altitude* appeared in *The Physiologist.* This year I was the only member studied; we lacked funds to invite the other survivors to a follow-up study.

The locales of the study were the same as in 1962, the laboratories of the White Mountain Research Station. This station has remained viable thanks to the support of the Regents of the University of California, the vision of Nello Pace, Director Emeritus and the support of the National Science Foundation and other agencies. The resident director Don Buser with headquarters at Bishop provided all necessary support and his staff was most helpful, particularly Hal Scharnhorst at Crooked Creek, 3080 m and Bill Williams and Dan Cutshall at Barcroft, 3800 m. We brought our own instruments except for the Van Slyke-Neill blood gas apparatus made available to us by John Severinghaus who collaborated with us in 1962 and who keeps it at the Barcroft Laboratory.

The success of our 1977 study depended largely on the talents and character of three colleagues ages 17 to 19 years who in their earlier high school years became student assistants in our Boulder City Laboratory. All are honor students and have athletic records. Jan Miller, a Sophomore and a basketball player at Pomona has acquired many skills in the past four years including mastery of the Van Slyke-Neill apparatus. Shortly before this study she became proficient in the art of arterial puncture. At Barcroft she learned how to calculate arterial pCO_2 from arterial pH and CO_2 content. Her crowning achievement was a puncture of my brachial artery at the Summit Laboratory, 4343 m at an ambient temperature of 6 C. Terry Goudy, Sophomore at UNLV has been my typist and administrative assistant as well as an expert in all techniques essential to assessing performance in desert heat. He did all the driving of our 4-wheel drive International successfully manipulating it over steep rocky roads to within about 100 m of the Summit Laboratory where he was blocked by a snow pack. Bret Foreman, Senior at Boulder City High School is looking forward to Cal Tech. Bret has a remarkable knowledge of electronics and has complete mastery of the Haldane gas analyzer. With these capable assistants who also took part as test subjects it was possible to study the responses in my arterial blood at each altitude as well as heart rate and respiratory responses and aerobic capacity on the bicycle ergometer at Barcroft. Observations also were made at all stations on each of us on heart rate, respiratory minute volume, respiratory rate and metabolic rate in the basal state. Other measurements included vital capacity as an indicator of pulmonary edema and composition of alveolar air. Hopefully the results will be ready for publication within a few months.

In conclusion, two bits of advice to my colleagues interested in high altitude: make use of the extraordinary facilities of the White Mountain Research Station; don't give up high altitude research because you are 86 years old.

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