A MEMORIAL

FOR

HARRY GRUNDFEST

(1904-1983)

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We gather today to honor Harry Grundfest, who died on October 10, 1983. He would have celebrated his 80th birthday on January 11, 1984. At the time of his death he was Emeritus Professor and Special Lecturer in Neurology. He had been on the faculty of P & S for 38 years.

Harry Grundfest was born in Russia and came to this country at age 9. He attended high school in Kearny, New Jersey and then enrolled at Columbia College. In the legendary survey course on Western Civilization he heard that a geneticist at Columbia was doing interesting work with drosophila. Grundfest thereupon approached T.H. Morgan, enrolled in one of the Nobelists's seminars although he was only a sophomore, and a career in biology was launched. Grundfest received his B.A. in 1925 and became a graduate student with Selig Hecht, a pioneer investigator of the physical basis of color vision. After receiving his doctorate in 1930, Dr. Grundfest worked for two years at the Johnson Foundation for Medical Physics at the University of Pennsylvania. There he met Detlev Bronk and there his interest in neurophysiology was propelled. For one year he was instructor in Biology at Swarthmore and he then returned to New York, to work at Cornell with Herbert Gasser, another Nobel laureate.

Two years later Detlev Bronk moved to the Rockefeller Institute, induced Gasser to move, and Harry went there as well, continuing that association for 10 years between 1935 and 1945. That period covered World War II, and Harry's CV states simply that in the years 1943-45 he was on leave of absence as a "Senior Physiologist, Climatic Research Unit, Fort Monmouth Signal Laboratory, U.S. Army Signal Corps." Harry's research was concerned with adaptation to cold weather, from appropriate clothing to power supplies. Although the subjects now seem mundane, four of the reports were listed as "restricted" by the Army; we do not know if they were ever published. That assignment at Fort Monmouth was to have fateful consequences for Harry Grundfest. His military connections terminated in 1945 when he worked briefly on a ballistic project in Princeton, studying the impact of bullets and explosives on mammalian tissues.

In 1945, after the war ended, Dr. Grundfest came to Columbia as a Research Associate in Neurology. He set up his own laboratory for the study of neurophysiology and he was also Director of the Peripheral Nerve Study Center, following the evolution and outcome of war injuries. Neuroscience is so strong at Columbia these days - in both the Biology Department on the Downtown campus and in the Center for Neurobiology and Behavior at P & S - it is difficult to realize that in 1945 <u>all</u> neuroscience at Columbia was in the Department of Neurology. It was Tracy Putnam, Chairman of Neurology at the time, who recruited Fred Mettler, David Nachmansohnn, Elvin Kabat and Harry Grundfest.

They were a powerful team.

Grundfest's meteoric rise to international eminence, his scientific achievements and his numerous star students will be described by Drs. Reuben and Glusman. These feats were achieved despite some obstacles. Harry was not permitted to have graduate students for about 20 years; I believe George Katz was the first. The laboratory never had enough space; it took ingenuity to create modern and efficient laboratories across Broadway in what was essentially a loft. The building was dilapidated even then, but still serves as a day-care center. Nevertheless, these were the glory years at Columbia, and the laboratory was bustling with postdocs from all over the world.

Despite the long association with Columbia, there was another institution in Harry's life. Each year, a moving van would come to 168th Street to transport tons of equipment up to Woods Hole and the Marine Biological Laboratory. Sometimes, one van was insufficient. The Grundfest lab functioned in Woods Hole for four months, and it was one of several laboratories that made MBL a neuroscientist's haven. The Monday evening seminars they founded are still going and the summer courses are still going, and the Grass labs are still going.

Harry received many honors - including election to the National Academy of Sciences of the United States, the Physiological Society of London and the Japan Physiological Society. He was also an Honorary Member of the Czechoslovak Medical Society. He was given the Claude Bernard Medal of the Sorbonne, was awarded the degree of Doctor "honoris causa" by the University of Geneva in Switzerland and he received the P & S Distinguished Service Award from Columbia University. He was given the highest award that the Japanese government bestows on foreigners, the Japanese Order of the Rising Sun. This international recognition was based upon Harry's contributions to neuroscience and to his influence in training younger investigators from many countries.

It would be appropriate to end this brief biography on a formal plane, but it is not really possible to speak about Harry's life without mentioning his politics. For it was politics that plummeted him into the national limelight in the early 50's. Like many people, Harry was bruised by McCarthyism, unlike most of them, however, Harry's encounter was with McCarthy himself.

We have not had access to the newspaper files of the time, so I speak from personal recollection, not precisely accurate. McCarthy was investigating Fort Monmouth in his search for evidence of a communist conspiracy in the Army. A biography of McCarthy, just published, concludes that McCarthy uncovered nothing at all, but the hearings went on for months in 1953 and the publicity was considerable. McCarthy spread his web to include people who had ever worked at Fort Monmouth.

Eight years later, Grundfest was called to appear before the McCarthy Committee. He refused to answer political questions on grounds of the First, Fifth and Sixth Amendments.

Harry had not been accused of anything. But the temper of those times is now difficult for the aged to recall or for the young to imagine. There was actually a serious effort by members of the Columbia Faculty to have Harry dismissed despite tenure. Some colleagues actually stopped woking with Harry. Fortunately, Houston Merritt and other wiser heads prevailed and Harry's already illustrious career flourished. What a loss to science and humanity it would have been if Harry Grundfest had had to stop his research as some, less fortunate, actually did in other universities.

Harry's politics may have been controversial but his knowledge of economics and international affairs was prodigious. I once heard him give a lecture on what he called Malthusiasm, long before population growth became a popular issue. But Harry was not calling for birth control; he wanted to raise the standard of living in underdeveloped countries, understanding that birth rates drop inevitably in developed countries. Whatever the political views of Harry's associates, I think they all recognize that it was his courage, and actions by others like him, that finally stopped McCarthy and that disgraceful episode. In his personal life, Harry was always warm and friendly, always ready to discuss a scientific problem, or to give career advice. He was always "Harry," rather than "Professor" Grundfest.

We extend our condolences to Rose Grundfest, Harry's wife for 58 years; his daughter Brooke; her husband Claude Schoepf, and their son, Eric; and to Harry's brothers, Philip and Jack, and his sister Rose.

ALEXANDER MAURO, Ph.D.

I am deeply honored to join all of you in a tribute to the memory of Harry Grundfest.

Harry was a dear friend and colleague for over 30 years. I shall not speak of his scientific accomplishments, his enthusiam for science, encyclopedic memory, breadth of scholarship in comparative neurophysiology and electrophysiology. I would prefer today to emphasize his uniqueness as a human being, his humane qualities and sensibilities.

In a word, Harry was a warm and generous man. He always displayed a spirit of generosity. By that I mean he was unfailing in his kindness and immediate willingness to help and to share with others. This was especially evident in his dealing with young scientists. He was lavish with his advice and counsel, laboratory equipment and funds, when they were available. Indeed, in the "loft" on the corner of 168th Street, Harry organized a laboratory in which dozens of postdoctoral fellows from Japan, South America, Europe and the U.S.A. worked happily in an ethos of warmth and collaboration. It was a virtual United Nations of aspiring young research scientists. It is imperative to mention that no one felt manipulated or exploited. There was complete freedom to carry out research and develop one's talents. Harry has won the everlasting affection of alumni of his laboratory.

In my capacity as a weekly lecturer on elementary principles of membrane biophysics, I recall vividly how hard I worked to prepare my lectures, for I took my assignment seriously. I was especially careful to provide a detailed bibliography pertaining to the topic of my talk in order to satisfy Harry's almost sacred view of science; namely, it is the product of a long, social process, a development of ideas involving the devotion of many individuals. Thus, in teaching science one should be as complete as possible in citing the crucial papers.

His sensitivity and concern for those around him extended to the community at large. Harry was deeply dedicated to the ideal of an international fellowship of scientists and intellectuals serving mankind - a deep, abiding principle which guided him throughout his long enthusiastic and productive life.

It was only in recent years that I detected a sadness in Harry's outlook. He was deeply disturbed by the crisis in funding for basic research, which resulted in the collapse of academic research positions for many young colleagues.

I can say with all sincerity that in my experience in academic science, Harry was unique in combining a passion for science and a deep sense of social responsibility. We shall miss him.

ELLEN R. GRASS

I am honored to speak of Dr. Harry Grundfest at his memorial service. Others will list his academic accomplishments . . . such is expected of deans, faculty and peers. I speak of Harry in the environment he loved, the Marine Biological Laboratory at Woods Hole, his summer home amidst the surf, the salt air, and his beloved garden. There he had ceaseless intercourse with neuroscientists of all ages, many brought under his influence by the Grass Foundation.

This, therefore, is a highly personalized and admittedly prejudiced account by a woman who could call Harry Papa Bear and get away with it!

My cortical computer has lately tended to corrode and refuses to recall the date and circumstances of our first meeting, about 1951, most likely. But even though the first encounter may have been unremarkable, the subsequent years during which Albert and I enjoyed his friendship are unforgetable and precious. John Reuben thinks Harry first went to Woods Hole intermittently during the late thirties. The official records of MBL list him as a member of the corporation first in 1946, and a trustee in 1967.

His laboratory at MBL soon became far too small to house the Columbia postdocs clamoring to enjoy the intellects and the squid at Woods Hole. In about 1961 the management agreed to combine and renovate several small rooms that he might create the kind of teaching environment he craved. The space became known as L-317. This evolved into the Grass Foundation Laboratory. John Reuben says, "It serves even today as it did in Harry's time to bring bright, enthusiastic, young scientists together. Individual labs were built around a central area that served as a conference, debating and lunch room. The objective: togetherness."

There occurred innovative work on invertebrate preparations, particularly marine forms, the study of electric organs and electroreceptors, the membrane characteristics of giant axons and synapses, and, more specifically, communication systems betweeen elements of the muscles and nerves of all living forms. Simultaneously the groups acquired skill in building electro-mechanical apparatus for stimulation and recording.

Albert and I have been fortunate indeed to have known two individuals with whom you need to be Lion-Hearted to debate. Arturo Rosenblueth was one: Harry was the other. They were masters at it . . . and played at it like chess . . . delighted when they found a worthy opponent. The distinguished Forbes Lecturers funded by the Grass Founation at MBL always looked forward to a Grundfest encounter. I recall particularly Bernard Katz, John Eccles, Alberto Aguayo and

Ricardo Miledi, to name a few.

Harry was at his best with about 10 postdocs circled before a blackboard, constantly interrupting each other with A-ha's, and But looks. All 250 or so of the Grass Fellows vividly remember that experience, for he met voluntarily and often with them all.

Although he was predominantly verbal, he wrote exceptionally well, too. It is said, "It does not take a great mind to make a simple thing complicated, but a very great mind to make complicated things simple." And, Harry had the latter ability.

He was a great respector of our scientific ancestors. Once I was preparing a lecture on early instrumentation in neurophysiology that described the development of the cathode ray oscilloscope system by Erlanger and Gasser. Harry quietly pointed out that while they may have made it work, Bernstein had stated the concept much earlier. Furthermore he sent me the reprint to prove it. That's my idea of scholarship. Detlev Bronk imaged our scientific heritage perhaps best of all when he said, "We are indebted to our predecessors for the knowledge which enables us to go beyond the limits of their knowledge, and that we find our fulfillment in our own successors."

I regard Lewis Thomas as one of the 20th century's finest essayists. He says, "These are not the best times for the human mind. All sorts of things seem to be turning out wrong, and the century seems to be slipping through our fingers here at the end, with almost all promises unfilled. We need to know <u>more</u>, and there it is. The best thing for being sad is to learn something. Learn why the world wags and what wags it. This is the only thing the mind can never exhaust, never alienate, never be tortured by, never fear or distrust, and never dream of regretting. Learning is the best thing for you."

Recently the Lillie Building at MBL was rather extensively renovated. The center section of seats in the lecture hall have been named. By a fortunate stroke of the alphabetical order, Grass and Grundfest chairs are closely aligned. Thus whenever we sit there to listen to some Wisdom from the Sea, we shall feel close.

An early television series featured that master clown, Jimmy Durante who always closed his show with, "Goodnight, Mrs. Calabash, wherever you are." I'd like to close my tribute to Harry in that same spirit of reverence. It is far from scientific, but somehow comforting to induge in a personal allegory.

In my childhood, recreation did not come from the airwaves. R-dios were rare, powered by smelly, acid-filled storage batteries, and certainly not portable. TV was but a spark in someone's neurones. So

we sang a lot. One song I remember begins, "Michael, row the boat ashore, Allelulia!" This is a slave song of unknown authorship, about a hundred years old, perhaps more. Michael is the chief of the archangels. This image in my childish mind then was of a boat rowed by a well-muscled, bearded giant with gleaming gold wings, escorting a dead relative to a Promised Land of unknown character shrouded in mist on the opposite shore.

Now I am thinking of Harry being rowed across waters resembling Vineyard Sound at its sparkling sunny best, the scent of honeysuckle in the air - a Harry finally free of angina and sheltered from the breeze by his ubiquitous pink jacket, probably debating with Michael the real answer to the "spits versus sparks" controversy.

If I but knew how, I'd cable Angel Gabriel to lay down his horn long enough to rustle up some lab coats with wing slits, xerox directions to reach the library, summon his best students to set up a blackboard, and clear off ample bench space in the lab, because Harry will be along soon. So good night, Harry, wherever you are. MBL and our Foundation will never be the same without you.

KIYOSHI KUSANO, Ph.D.

My name is Kiyoshi Kusano. I did my post-doctoral work with Harry for a period of two years from September 1961 through 1963. Since then, he had been my mentor and a very good friend. I was one of the early Japanese trainees in his laboratory. Starting with Akira Watanabe in 1959 to Masataka Kawai in 1973, Harry trained twenty Japanese post-doctoral fellows with his research grants. In addition, there were a number of Japanese physiologists who visited Harry's laboratory in order to consult with him. Harry treated them warmly, even though there were some difficulties involved in communicating with us, because of our "Japanese-English," which he learned faster than we learned standard English. All of these Japanese visitors felt Harry's warm personality. Today those who received training from Harry are leaders in many areas in neuroscience in Japan. This year in order to express our gratitude, he was elected as an honorary member of the Japan Physiological Society. The Japanese government has also extended its gratitude for Harry's continued support of Japanese neuroscientists.

Shortly after a Symposium in honor of Harry's retirement in December 1974, I was asked to write about Harry Grundfest and that Symposium for the Japanese popolular magazine "Bioscience" for the purpose of introducing him to many Japanese scientists and students. Briefly, I wrote about his personal history, including his problems during the McCarthy era, his friends' support extended to him during that period, the establishment of his neurophysiology laboratory on the 2nd floor in the Kramer building, his scientific accomplishments and some highlights of that Symposium. In addition, I wrote about my personal experiences with Harry. In short, Harry never asked us to do a particular experiment; he gave us general suggestions regarding experiments and their analyses. He impressed us as a living encyclopedia. Discussion with him was very frank.

He always listened to our explanations. If there was an error in his explanation, he aways said without hesitation "pardon me, my explanation was incorrect." He liked to be called "Harry" rather than Professor Grundfest, which was not very easy for us because of our Japanese custom. His frankness during our discussion impressed us very much, since many of us never had such an experience with professors in Japan. He was very eager to learn about all work progressing in his laboratory, even though there might have been as many as ten different experiments in progress. Therefore, he spent much of his energy summarizing the large mass of data generated in the laboratory. Often, I saw him resharpening scissors and forceps and helping technicians to exchange old amplifer batteries.

I also remember quite well that pickles were his major lunch diet for sometime. I believe someone told Harry that pickles were good for his health. Initially, Harry bought small jars of pickles. But, since he offered his pickles to all of us, often about ten people, we quickly ate up his pickles. Harry, then started buying larger jars of pickles. Often additional people from across the street joined his lunch hour to talk with Harry and to eat his pickles. All of us ate Harry's pickels, but we never paid, at least I don't remember paying a single penny for the pickles. This lunch hour was a time of active discussion in the laboratory about new data, politics and other things. Harry often took us to a Chinese restaurant after deparmental seminars. He loved

These are part of my pleasant memories of my experiences with Harry, and I feel very fortunte to have been associated with him. I believe all his pupils and friends feel the same way. We were very saddened by his recent death, but Harry's warm hearted humanitarian personality touches us deeply and will be remembered by all of us.

MURRAY GLUSMAN, M.D.

When I heard of Harry's passing I was terribly saddened and promptly called his wife, Rose Grundfest, to offer my condolences. She told me how he objected to the use of heroic measures to prolong his life. And as we talked I was impressed - not only by the recognition of her great inner strength in coping with the loss - but by something she said: that it would be difficult to get used to Harry's passing because he occupied a lot of space. I was struck by the way Rose put it. But Rose is an artist and artists are very conscious of space. And certainly on the canvas of Rose's life Harry occupied a lot of space. He occupied a lot of space in their daughter Brooke's life, in my life, in the lives of all of his students, and of the people here, and of all his colleagues and associates. Harry occupied a lot of space in science throught the country and throughout the world.

He occupied a lot of space because giants occupy a lot of space and in many ways Harry was a giant.

Harry was a big, bluff, hearty man, who exuded warmth and confidence. He was soft-spoken, had a fine sense of humor, and a quick, hearty chuckle. He was totally devoid of prentensions; and he had a towering intellect. He was a genial giant.

He lived, ate, breathed and slept science. He was a scientist's scientist. His output was prodigious - roughly 550 publications in the most prestigious scientific journals in the world.

The quality of his contributions was impeccble and his achievements were brilliant. He was fascinated with the function of the nervous system, but he felt that the mammalian brain was far too complex to be dealt with effectively at the present stage of our knowledge. Instead, using the reductionist approach of the biophysicist - or for that matter - the nuclear physicist - he zeroed in on the most basic and fundamental problems in the nervous system - the excitability of the nerve fiber, the conduction of the nerve impulse and its transmission across the synapse. He pursued problems in this general area for over 50 years, starting with a paper in 1932 which was published in the American Journal of Physiology on the "Excitability of the single nerve muscle complex." From 1936 to 1939 Harry published 6 papers with Herbert Gasser at the Rockefeller Institute on conduction of the action potential in nerve fibers - the general topic for which Erlanger and Gasser were awarded a Nobel Prize in 1944. Harry, for reasons which I don't understand was not named in the award. The committee in Stockholm has had its share of errors of omissions and commission - this was certainly an error of omission - and a refletion on the Committee, not on Harry.

Harry was a highly verbal individual with an encyclopedic fund of information who contributed to and elevated the intellectual level of any meeting he attended. A resourceful and dauntless debater, he was perhaps at his best in the great debates that raged between the "spark" men - or electrophysiologists - and the "soup" men - or neurochemists - in the late ´40´s and ´50´s on the mechanisms involved in nervous conduction and synaptic transmission.

For Harry teaching science and doing research were inseparable. His laboratory was always full of postdocs; he trained generations of neuroscientists and the roster of his students and collaborators constitutes an international "who´s who" in the neurosciences today. He was genuinely interested in his students and maintained life-long friendships with them. What he taught was a marvelous ability to phrase a problem in meaningful experimental terms. He was gifted at penetrating to the heart of a problem and making order out of masses of seemingly disordered data. He knew how to draw sound and meaningful conclusions from the results of an experiment and somehow he managed to transmit these gifts to his students.

Harry worked and taught 12 months a year. His idea of a vacation was to pack his lab into a moving van at the end of May for the annual northeastward migration to Woods Hole - with students following along in a caravan on Interstate 95. He never acquired a tan in Woods Hole, only a slightly greenish pallor from staring interminably at oscilloscope screens. In September the process was reversed and the migration headed southwest to P & S - or the quarters over Kramer´s surgical store.

He was an international resource as a teacher, a fact which was recognized by the government of Japan when he was decorated with the Order of the Rising Sun - 3rd Class, Japan´s highest decoration to a civilian in appreciation of his role in training Japanese neuroscientists.

His interests and energy seemed limitles, extending far beyond the boundaries of the laboratory. He was a "statesman" of science: and by testifying before Congress he played an important role in the establishment of the National Science Foundation.

He was concerned with public affairs, social issues and social justice. He loved to express his views in "Letters to the Editor." And it mattered little whether it was the Editor of the New York Times or the Falmouth Enterprise. He was harrassed by the McCarthy Committee for his concern with social justice and it is to the everlasting credit of Columbia that a formal University Committee came to his defense in a ringing passionate statement upholding the basic principles of a free society and intellectual and academic freedom at Columbia University.

Harry led a long and full life - and he leaves behind him a rich legacy of scientific and intellectual achievement. Nevertheless, we will miss him - because not many giants strike the earth.

JOHN P. REUBEN, Ph.D.

To some Harry Grundfest will be remembered primarily as a scientist - one who made numerous contributions, documented in over 500 publications, to the field of neurophysiology.

Harry's contributions include discovery of a number of fundamental principles of excitation in nerve, muscle and electroplaques. His work reflects both the breath of his interest and influence on the growth of neurophysiology. Studies were instituted showing conduction velocity of action potentials in mammalian mylinated axons are a function of fiber diameter. He proposed that there are two types of cellular membranes - electrically inexcitable and electrically excitable, and he found that both kinds of membrane are heterogenous with respect to the type of ion selective channels and the type of receptor.

The 1960's studies on muscle discovered that excitation-contraction coupling in crayfish muscles consists of the channeling of ionic currents between different permselective membrane at the cell surface and those of the transverse tubular system. Further studies on skinned muscle fibers showed that the complex of ATP and magnesium is the substrate for tension generation and that excess substrate inhibits tension.

While many will remember Harry for his scientific contributions others will remember him as a humanitarian - one who could be depended upon to provide inspiration, encouragement, and advice to all who requsted it. One who was not only deeply concerned with rights of the individual, but one who would act and take stands on their behalf.

To those of us who worked with Harry Grundfest and who were his students, he will be remembered in a way that would not be adequately expressed by my words alone. Rather than attempting to do so, let me read to you some excepts from a few of the many letters written by his students and collaborators at the time of his Festschrift in 1974. While some were written to Harry most were addressed to me, and were subsequently compiled in book form, and presented to him. Since time will allow for only a few quotation from the more than a hundred letters, the names of the writers are not included. There are, however, common thoughts expressed throughout these letters and those selected exemplify them.

I quote "The ambience of Harry's lab was a wonderful place for the neophyte neurophysiologist. A wide variety of experimental preparations and problems reflecting Harry's extraordinary range were under study. Investigators from all over the world were actively engaged in research, providing an exciting cultural mix There were information discussions each noontime and distinguished

neurophysiologists visited frequently. Exposure to their data and ideas provided an effective antidote to the temptations of laboratory tribalism and dogmatism. The vital and productive milieu described but briefly here, was directly related to Harry's leadership. All of us marveled at Harry's ability to absorb the varied data emerging from the lab and at his broad knowledge of the scientific literature. His superb biological intuition and historical perspectrive added greatly to the sophistication of the laboratory. During the frequent and inevitable disagreements about interpretation of data, Harry's ability to tolerate differences of opinion and his willingness to be proven wrong by experimental evidence and rigorous thinking were excellent models of behavior for a young investigator. Science cannot completely define the man. Harry's interest in the arts, history, and world affairs constantly broadened and spiced our conversations. His humanitarian outlook, scientific scholarship, and loyal friendship have made a tremendous impact on me and will continue as a powerful influence in my life and work."

Another quote: "I spent my last dime to buy a ticket to the United States so strong was my wish to work under Harry Grundfest. My expectations were largely fulfilled with the difference that nobody was working under you, everyone was working with you. As I grew to know you I understood why you could afford to accept beginners: you have so much drive and enthusiasm that you do not need importations in such matters. You were so willing to share your immense knowledge and I learned from you for 2 years and I never took the time to thank you - you never asked for it. Years later your teaching is alive in Switzerland, since the best I can do for students is to pass on some of the spirit you put in everything you touched upon."

Another quote: "Apart from my training what I appreciate most from Harry Grundfest is his existence. Next to him, most men of science seem short-sighted or timid. How many opportunities do we have to become acquainted with men of principle, sensibility, intelligence, and breath of knowledge? I am privileged to have had one."

Another quote: "The time I spent in Harry Grundfest's laboratory evoke a variety of emotions, but above all there are memories of comradeship of belonging to a highly organized and respected laboratory with a leader whose loyalty to all those who came under his umbrella stands supreme."

Another quote: "Your role outside your commitment to the biological sciences, in the world of radical and progressive thought, has been enriching to many of us. It is only one example to recall that in the McCarthy era, to have stood up to him as you did was a proclamation of faith in mankind. Thank you, Harry, for 12 vintage years."

Another quote: "I would like to point out the exceptional air of cordiality, the readiness to help and the wonderful inspiring atmosphere in Harry's laboratory. Thanks to Harry Grundfest I was able to organize one of the first electrophysiology labs in Poland."

One of our Japanese colleagues ended his letter to Harry by stating "that you will always be remembered by me as 'Harry Taijin' - a great wise person."

I want to read the following received from Dom Purpura, Dean, Medical School Stanford University: "I will be very grateful if you could extend my sincerest regrets for my inability to attend the Memorial service for our dear friend and colleague. Harry was very special to all of us who enjoyed the privilege of working with him. He gave his time, energy and enthusiasm with the same generosity he gave of his life. We are enriched by the experience. To paraphrase Osler, there are those present who will feel, and no exaggeration when I say, that to have known Harry Grundfest was, in the deepest and truest sense of the phrase, a liberal education."

From Paul R. Gross, Director and President of the Marine Biological Laboratory: "Harry Grundfest influenced many lives, including my own, through his teaching, his clear and scholarly writing, and most importantly, through the rigor and incisiveness of his research. In many ways his professional course was congruent with that of the M.B.L. during the 30 years past. Nor were his contributions to the laboratory limited to the sub-discipline whose name was a synonym for his own: electrobiology. In the role of friend, advisor, and trustee of M.B.L. and its administrations, he helped to insure that it would survive and that its scientific product would remain of the highest quality. We - the Corporation and Trustees of M.B.L. - as well as Rose and Brooke have lost an irreplaceable asset, and hence we are more than sympathetic with their bereavement: we share it."

And again from - Dom Purpura

Whatever way my days decline,
I felt and feel, tho' left alone,
His being working in mine own,
The footsteps of his life in mine . . .
Tho' much is taken, much abides.

BROOKE GRUNDFEST SCHOEPF, Ph.D.

Thank you all for coming this morning to pay tribute to the memory of my beloved father. The preceeding speakers have made my painful task much easier, and I shall be brief. Several speakers reminded us that due to one of the regularly recurring patterns of American culture - the witch hunting of critical thinkers - Harry's contributions to science were almost cut short. Another cultural pattern, this one of East European Jewery early in the century, almost kept Harry out of science altogether. Let me share with you a story that Harry told about himself.

Like many bright sons of Jewish families, Harry was sent to Yeshiva to absorb Hebrew learning and become a rabbi. Endowed even then with an active curiosity which led him across frontiers of knowledge, he one day accepted a leaflet from a Christian proseletizer. At his school desk he began reading, the leaflet inserted between the pages of the Holy Book. The Rabbi came to see what the good little 'bucher' was studying before class. Glimpsing the text over Harry's shoulder, the teacher was aghast! He gave Harry a belt on the ear which Harry returned, promptly ending his career in the rabbinate and, at the same time, freeing him to pursue scientific studies.

Encouraged by their parents, Harry's younger siblings also took up science. Dr. Rose Grundfest Schneider is a biochemist, Dr. Philip Grundfest is an obstetrician-gynecologist and Dr. Jack Grundfest is a surgeon. To them Harry was an example and a steadfast support.

Harry's independence of spirit and lively sense of justice were matched by his solidarity with the oppressed and those not fortunate enough to have a life's work they enjoyed and did well. He also told this story.

One summer during his college years Harry operated a drill press at the Hyatt Ball-Bearing Works in Kearny, New Jersey. Mastering the job in a few days he soon began producing pieces in excess of the daily quota. An older worker reproached him: "Sonny, you'll go back to college in a couple of months. The rest of us have to stay here all our lives. Not everybody can keep up the pace year after year." So Harry, bored with the job, kept up his speed but passed out the extra pieces among those of his fellow-workers who could not meet the quota.

When he encountered the labor theory of value and the theory of work alienation in industrial capitalism, Harry was prepared, by his experience, to understand. One of his favorite songs contained a line he made his credo: "He wants no servants under him and no boss over his head."

Harry took his philosophy with him into research where the leadership of teams is an especially fine art. Others have spoken already about his skill in research management, in eliciting complementary creative contributions from independent and competitive people. Harry had that rare quality: security in sufficient measure not to feel threatened by excellence in others. He set himself the tasks of obtaining material resources and of providing intellectual stimulation and critical appraisal tempered by emotional support. Harry consciously set out to structure social relations in the laboratory quite differently than the prevailing mode in science and society of his time.

The Kramer building lab was deliberately designed around a central common space to foster collaboration while at the same time affording maximum privacy to individuals and pairs of investigators. But in many workplaces central spaces merely serve as corridors rather than as genuine meeting-places. Harry set the tone by using the space to symbolize the social structure which he strove to attain. At the front, his large office with its open door signalled both his leadership and his availability. Watching Harry was a lesson in how to go about teaching others.

Creativity to him was a struggle. His demands on others were exceeded by those he imposed upon himself. His wastebasket overflowed with discards of successive drafts as he rewrote his own reports and edited those of others. Although Harry was both prolific and proficient in his command of English, it was his third language and not his native tongue. If Harry was impatient with other people's theories, he also never was satisfied with the adequacy of his own. This dissatisfaction led him to stimulate others to carry on the work, to forge ahead across the existing frontiers.

Harry was convinced that truth is ultimately on the side of humanity and rejected the pessimism of the conservative world-view. He directed his interest to areas in which the sciences are used unscrupulously by those who seek a cloak of legitimacy for anti-human social policy and practice. Let's look for a moment at some of the issues which attracted his concern.

In the early 1940's Harry, along with Rose's brother, the late Professor David Danzig, worked out a popular pamphlet debunking racist myths prevalent at the time. Their main target was the racism prevalent in the armed forces which both had an opportunity to witness first hand. The Races of Mankind was published under the authorship of two Columbia University anthropologists, colleagues in the Association of Scientific Workers, the U.S. chapter of which Harry helped to found. The Association, to which Harry contributed enthusiastic support and leadership, was in the forefront of the struggle of scientists to

exercise social responsibility.

Harry also urged that advanced education be made available to the millions of servicemen and women following demobilization. When we moved back to New York City in 1945 he discovered that girls were barred from the public high schools specialized in teaching the sciences as preparation for future careers. Appalled at the state of math and science teaching in the district school to which I was assigned, Harry joined with other parents and educators to get the Bronx High School of Science to admit girls on an equal footing with boys.

Following World War II, Harry advised policy-makers whose Cold War bellicosity and illusions of American omnipotence were fueled by the exclusive possession of atomic weapons of fantastic destructive force, that Soviet capability in this field was not far behind. He urged that ways be found to "ban the bomb" and that all scientific research be rendered public and international. He considered it incongrous that his wartime research on cold physiology, protective arctic clothing and gunshot wound repair should remain "restricted."

Harry worked with others to create public understanding of the necessity of academic freedom for scientific and human progress. He became alarmed at the China Lobby's use of "yellow peril" scare tactics to mobilize sentiment against the Chinese revolution. Noting also the convergent reappearance of Malthusian ideas about population growth, Harry in 1951 published a critique of Malthus' original argument and presented an alternative, encompassing the theory of demographic transition, showing that with industrialization, rising standards of living lead not to higher growth rates but to their decline (Grundfest, 1951, Monthly Review, p. 248). In this article Harry challenged modernization theory which held sway as the dominant paradigm in development studies of the time, demonstrating that poor countries are poor independently of their population densities. He added his voice to those who pointed out that the basis of colonial misery is a combination of industrial under-development and the exploitative "extraction of their resources for the (capitalist) world market" (ibid: 251). If this sounds commonplace today, this is because the paradigmatic status of modernization theory has been undermined by the intervening three decades of challenge in anti-colonial struggles and replaced by a theory which Harry's critique in small measure helped to shape (cf P. Baran, 1957, The Political Economy of Growth, New York: Monthly Review Press).

Harry also pointed to the inhuman, racist, even genocidal implications of policies being proposed and justified by the Malthusian resurgence. These included withholding scientific medicine from China and other non-western countries and surreptitious feeding of oral

contraceptives to women. Such proposals Harry classed with the new "fantastic weapons" as an eminent danger to world peace and to the survival of American society and culture. He joined in the call (as Pope John Paul II did just last week, in November 1983) to scientists to disengage themselves from these activities. He urged that instead, the great American resources be used to help the colonial peoples "make rapid progress in all spheres of their life" (Grundfest, 1951:255).

At this time Harry served as Chairman of the Medical Advisory Board of Hadassah, the Jewish Women's voluntary organization, overseeing the building of the medical school and hospital in Jerusalem. He worked with the architect, Munio Neufeld, to design the most innovative, modern medical school in the Middle East. His understanding of central spaces evolved out of this work, for he and Munio used a centrally placed nursing station to facilitate the flow of practioner-patient communication and so enhance patient care.

So, while Senator Joseph McCarthy may have been hunting phantasmagorical conspirators at the Fort Monmouth of an earlier time, his attack upon Harry was an attempt to silence a critical scientist whose academic status lent credibility to his social analysis. McCarthy attacked Harry with a parting threat: I'll see that President Kirk gets a copy of this testimony - - or words to that effect. The ensuing period was extremely stressful for Harry and his family. Dr. H. Houston Merritt, Chairman of the Department of Neurology, refused to be intimated and stood for for academic freedom. Harry kept his job but lost his passport, thereby reducing his international scientific and humanitarian activities. And when his grandson, Eric, was born in 1958, Harry was unable to travel to France to share in the joy.

In 1974 (in a manuscript) and again in 1980 (Nature, 286:102,1980), Harry returned to the problem of resurgent Malthusiasm, for he feared new attempts by policy makers to use population growth as a pretext for withholding development resources, including health care, from the poor and for assuaging the consciences of the wealthy. Current U.S. government budgeting for technical assistance bears this out. Harry also worried that limiting medicaid funding for abortions - an apparently anti-Malthusian gesture - would increase the death-rate among poor teen-age women and thus contribute to Malthusian policy initiative by reducing the numbers in a potential high fertility cohort (letter to Robert Lekachman, undated).

Throughout his adult life Harry was interest in the socialist experiments taking place in the U.S.S.R., China, Cuba and in Africa. He supported the efforts of peoples everywhere to attempt to transform their societies in the direction of material plenty, useful creativity and social justice which as a young man he had hoped to witness in his time. Without losing his critical faculties, he understood the

difficulties of their struggles . . . and of our own with the threat of nuclear holocaust and human extinction hanging in the balance. To the end Harry remained optimistic, for he saw many people - including scientists - committed to a vision of a just, humane future for the world's children. He hoped that our efforts might bear fruit in time to stop the militarists' adventures from carrying us to the brink. He was confident that from a peaceful future would emerge eventually a progressive social transformation.

There were hardships and disappointments as well as triumphs and joys in Harry's life. He was heartbroken at the dispersal of the lab. Above all, however, let us remember Harry as among those fortunate enough to be able to indulge in his greatest passion throughout a long lifetime: participating with others in joint endeavors of high purpose and reward.

Our family, naturally, both gained and lost from Harry's great committments. In the early years he was often preoccupied with his work. Later, Rose sometimes felt black-and-blue from people clambering over her to get to him. And there were fall-out effects from the witch hunt's "guilt-by-association." We all feel, however, that the inconvenience of living with a person of such tremendous creativity and vitality were hugely outweighed by the love and tenderness he gave us and by the intellectual excitement we shared in so many dimensions. As is evident from this account, my own debt to Harry is not merely to a genitor and nurturer but to an intellectual pater; to one whose concerns, enthusiasms and understandings so markedly shaped my own. Harry will continue to occupy a large space in our lives and we shall continue to miss him more than I can possibly express in words.

On behalf of the family I wish to express our gratitude to all who share our grief. Thanks to those who came to pay tribute to Harry's memory as well as to those who sent messages but could not come. Thanks especially to all the friends and colleagues who so eloquently expressed their warm feelings of love, admiration and respect from the chapel podium. Thanks most especially to Dr. John Reuben, Dr. Lewis Rowland Dr. Phil Brandt and Dr. Masataka Kawai, who assumed the difficult tasks of convening the memorial meeting. And thanks above all to the person who never speaks from platforms and never shares the limelight and yet without whom neither the memorial meeting nor the fabulous productivity of the Laboratory of Neurophysiology would have been possible: Mrs. Anne Florant.