

REMARKS BY JOHN B. ANDERSON\*

Joint Committee on Atomic Energy  
Congressman from Illinois

Thank you very much, Dr. Teng, distinguished guests here at the head table, and ladies and gentlemen. I am, of course, very pleased to learn that on this fourth particle accelerator conference you have chosen the State of Illinois for your meeting. I am not sure whether or not the Chamber of Commerce of this city had to work as hard to get your conference to come here as some of us on the Joint Committee did several years ago to make sure the National Accelerator Laboratory was located in Illinois, but, in any event, we are very pleased that you have further confirmed what we think is a very preeminent place that the sovereign State of Illinois now holds in the field of high energy physics.

Frankly, I am not entirely sure why I have been so honored with a request and with the opportunity to address this distinguished assemblage of scientists and engineers. I can't help but think of the fact that yesterday evening I was addressing an audience down in Bloomington, Illinois. The occasion for my presence there was as befits a member of my party--we were celebrating the birthday of Abraham Lincoln. In connection with some of the research that I did to prepare for that speech, I found that on one occasion Lincoln had come to Bloomington the year before he was nominated for the presidency, and he had come for the purpose of delivering a lecture--one which he was accustomed to deliver before audiences in the state--a lecture on scientific discoveries and inventions. He got to the hall on this particular evening and for some reason there were only forty people in attendance, and he was so offended at the small crowd that he refused to speak. So thereupon it was necessary that those who had organized the meeting refund the admission fee, which was twenty five cents, to each of the forty people who had gathered. It occurred to me that, in view of my complete lack of expertise, if it had not been for the fact that Dr. McDaniel and Dr. Donovan had already paid your expenses to come here there might be some of you who would be asking for twenty five-cent refunds, because, fortunately or unfortunately for you, I intend to deliver my remarks.

Looking over your program and some of the very esoteric papers, at least esoteric from a layman's standpoint, that have been prepared, I come to the podium this evening in the proper spirit of humility and modesty, although whenever I think of modesty I think of that story of Winston Churchill. On one occasion someone had remarked to him that his political opponent, the labor prime minister, Clement Atlee, was an extremely modest man, whereupon

Churchill replied, "No man had more to be modest about." I am in somewhat the same position tonight with regard to my own qualifications.

It also occurs to me that I have already had one run-in today with technology. Those of you who are sitting close enough to the speaker's table this evening may have observed that I have a gash above my right eye. Actually, that came about when I was involved in a collision with the leading edge of a wing of an aero commander as I was trying to make my way out of Bloomington this morning. Now try to explain a story like that to your wife when you get home. I probably, however, would have a better opportunity of explaining that in understanding terms than if I were to try tonight to attempt a discussion of the prophecy which I read recently, a prophecy that has been attributed to the staff of the Stanford Linear Accelerator, namely, that with the much higher energy that will shortly be achieved at the National Accelerator Laboratory of Dr. Wilson, one might actually be able to produce a quark in the laboratory. Well, I couldn't even fathom Dr. Murray Gell-Mann's explanation of the origin of that term, quark, when on one occasion a few years ago he tried to explain it to the Joint Committee and related it to the work by James Joyce, "Finnegan's Wake." It went over my head then, and I wouldn't try to repeat it now.

My real reason, ladies and gentlemen, for coming here tonight is to try to obtain from some of the experts who are here assembled an explanation of the scientific value of hitting a golf ball on the moon. As some of you know, we in the Congress earlier this afternoon had a visit for a brief period with the members of that recent mission of Apollo 14, and Alan Shepard, the commander, told us today that this was a scientific experiment. There are some of us who suspect that the astronauts were really checking out the terrain as a possible private golf course for the Vice President.

In a somewhat more serious vein, I, of course, would observe that as a member of the Joint Committee on Atomic Energy, a Committee that does have to exercise, rather jealously, its oversight function of the Atomic Energy Commission, which in turn is that body within the executive branch charged as the executive agent with responsibility for the coordination of our nation's high energy physics program, that I do welcome this opportunity tonight to salute the men of this program, the men who have contributed so much in recent years to our better understanding of the basic knowledge in this field. I can certainly agree with some of the statements that I came across recently when I was looking at an analysis of

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the President's fiscal 1972 budget, prepared by Dr. Panofsky and his staff, in which they said that the richness of this field in terms of basic discoveries continues to increase, and the elementary particle physics of yesterday is the basis of nuclear structure physics today. The relation of high energy physics to processes in cosmic systems is now beginning to be evident.

Having indicated my unequivocal agreement with that particular pronouncement some of you may wonder why it is that in the prepared text of the remarks that I have distributed I saw fit to entitle them, "HELP." I did not do so to provide an acronym for High Energy Laboratories (for) Physics, lest the high energy physicists who are here tonight tend toward some paranoia as they ruefully contemplate the realities of the fiscal 1972 budget. Since I understand that you have already had a very adequate exposition of those matters from one of those who preceded me on the program, Dr. Donovan, I won't undertake to discuss the details of the funding for these various programs. Certainly those of us on the Joint Committee have had occasion, in the last couple of years, to note a rising tide of resistance to some of the efforts that we have been trying to make to provide the necessary funding for a reactor development program, as those who are today so freely predicting equal catastrophe because of atomic power reactors have raised their voices in dismay and dissent to the moneys that we have sought to authorize and appropriate in that field.

I was reminded of some of the resistance that is greeting us in these areas of scientific research when I got a letter from one of my constituents from Lee County in the district which I represent here in northwestern Illinois. This particular lady was incensed, as some of my constituents are, about where her tax money was going. She enclosed a newspaper clipping, an item that pointed out that the average taxpayer worked 2 hours and 34 minutes in every 8-hour day just to meet his federal tax liability. The article then went on to point out that tax money was going to fund such "worthwhile" studies as "Dust Distribution in Germany," "The Weathering of Rocks under Humid Tropical Conditions in Malaysia," and finally, as if that were not enough, a study of "The Cause and Cure of Frayed Shirt Collars." There is some very considerable opposition, therefore, to even what I am sure most of you here in this room would regard as the wholly inadequate amounts that are provided in the current budget for scientific research.

Of course, there are reasons, in addition to those that I have just mentioned, why it is becoming more difficult to find the funds to take care of the research needs of our country. I don't know that many of us tonight would be quite as gloomy as Philip Handler, the President of the National Academy of Sciences was when last year he declared, and I quote,

"Our national apparatus for the conduct of research is not yet dismantled, but it is falling into shambles. Morale of the scientific community is lower than at any time since World War II. New fields of scientific exploration clamor for attention and funding."

The question is, what went wrong with this beautiful dream of ours? One man who thinks that he has some of the answers is a man by the name of Daniel Greenberg, who, just last Sunday, in an article which appeared in the Washington Sunday Star entitled, "Why Politicians Stopped Trusting Scientists," assayed to give some of the reasons. In the course of his article, he pointed out that last year when the French president, Pompidou, was touring the United States, he paid a visit to the 2-mile long Stanford Linear Accelerator, which, as I recall, cost something like \$114,000,000 to construct and is costing some \$25,000,000 annually to operate, all of this funded by the federal government. Yet the French president was informed on that occasion by the director of that facility that basic science in America is not in excellent condition, and that, in his opinion, things were far healthier in Europe. As the author suggests, this may have come as something of a surprise to the French president who had just presided over a savage pruning of the French national research budget. About that time the western European nations were still deadlocked over the plans for the construction of an advanced nuclear accelerator, a project which Great Britain dropped out of in 1968 because of economic reasons.

I think it was back in 1963 that Dr. Rabi pointed out that there is something like a Parkinson's law that scientific activity will grow to meet any set budget and find it to be grossly inadequate. Well, those of you who know the acerbic doctor realize that he was not exactly joking when he made that particular remark. And I would have to agree with Mr. Greenberg when he suggests that scientists, to a certain extent, have lost financial favor today with not only the general public but with those in government because they have lost a certain amount of credibility with the political leaders who for a long time have accepted them on faith. I don't think that's the whole reason, by any means. I think that any casual observer of the contemporary scene would recognize that with the concern that has developed over the state of our environment, man's environment, the Congress today is much quicker to pour millions, if not billions, of dollars into programs that are geared toward doing something about cleaning up the environment than they are to put money into programs of basic research. Because we do live today in what some have described as an era of "band wagon hopping" and of crash programs, it is even popular in many places to be anti-nuclear. You ask the average American, Mr. and Mrs. American, why he or she is against nuclear power plants, for example, and you will get

answers like these: "Who wants to live near an atom bomb?" "The radioactivity will poison the atmosphere." Or, "The hot water from the generating plant will kill the fish." If you go on to ask what to some of us seems like an eminently reasonable question, whether or not fossil fuel plants don't also discharge hot water, you are chided for asking a totally irrelevant question. So, as a result of some of these trends, we find that our electric energy needs are outstripping our present production capability and planned new capacity is starting to fall behind what our needs will shortly be.

How does this current fear over equal catastrophe affect research, development and the growth of technology in our country? As I have indicated, many of the dollars, which, in the past, we have traditionally earmarked for physical research programs, have now been diverted to the war on environmental pollution. In addition to that, fuel costs are inflating power prices and higher priced electricity is dissipating accelerator operating budgets. The shuffling of programs that is today going on in government and the shuffling of agencies is further diluting the payout from financial resources and is, unfortunately in my opinion, wasting our most precious resource, the skilled, highly-trained people who function in this area. In an era of stagnant or reduced budgets, what then do we have left for new gadgetry or for retaining some of these people? Or even for retaining entire laboratories? I make the latter comment because on June 30 we will see the end of AEC support for the Princeton-Pennsylvania Accelerator on the James Forrestal campus of Princeton University. This, to me, is certainly an unfortunate event. It will not only cut off support from a government financed facility that cost almost 50 million dollars to establish, it will cut off support for a facility that has not yet come into its own, has not yet fully come into productive operation. Why was this decided? As some of you may recall, the AEC said at the time the decision was made to excise this facility from its list of supported institutions that in view of continually declining budgets, funds were being spread so thin that all of the high energy physics plants were losing productivity. Something had to go, and PPA at 3 BeV was low energy on the totem pole, and so it went.

Was this a wise choice? Would it surprise you tonight if, in all candor, I would have to admit that I'm not really in a position to judge? The arguments that were advanced by the AEC were cogent, they sounded reasonable, yet the arguments that were advanced by Professor White, the director, were cogent and sounded reasonable as well. The tragic thing, I think, really is that Professor White and the outstanding staff that he had assembled, his students, the technicians, and host of university user groups had to lose out as a result of that decision. Because, while the facility is yet alive, the

obituary has already been published.

This leads me next to the question, and perhaps I should refer to it as a problem that deeply concerns many of us in the Congress. For many years we have been told, and frequently by rather imperious, professional-sounding gentlemen, that the federal budget must, in each successive year, provide a stipulated increase in certain research fields. If I recall correctly, when I was a member of the Joint Committee back in 1965, that was a banner year for all kinds of publications of that kind. Let me recall for you, if I may, some of the better known titles. There was:

"Policy for National Action in the Field of High Energy Physics," by the Atomic Energy Commission,

"Nature of Matter: Purposes of High Energy Physics," edited by Dr. L.C.L. Yuan of Brookhaven National Laboratory,

"Basic Research and National Goals," A Report by the National Academy of Sciences to the House Committee on Science and Astronautics.

I was a member of the Joint Committee that in March of 1965 participated in hearings held on the subject of high energy physics research. In January of that year, then President Johnson sent to the Chairman of the Joint Committee the aforementioned document on national policy and high energy physics. The year previous, in 1964, the Joint Committee had asked that such a national policy be developed because of ever increasing stated requirements for high energy physics research. The hearings in 1965 were successful, I think, in that they did much to explain the whys and wherefors of high energy physics, some of the machines, and the men who designed and operated them. During the course of the hearings, many charts and tables were exhibited to show how the future program in this field should be funded. I remember, particularly, one chart, which you will find on page 790 of the 1965 hearings, that showed a funding progression, and the slope of the curve is about equal to the "climb out curve" of the most modern jet airliner. You smile, and rightfully so, because we note on that curve that for high energy physics this would have meant an increase from a fiscal 1965 figure of about 175 million dollars, for all expenses, to a projected 350 million dollars for the budget that is now before Congress, and that was supposed to rise to a peak of a nice, rounded-off figure of 500 million, or a half billion dollars in fiscal 1978.

That beautiful dream, I suppose is comparable to the one that we alluded to, which appears in Joyce's "Finnegan's Wake," where that term, "quark" supposedly originated. I would have to point out, in all candor, that that particular curve was an assumption by people who were not in government. It was not, I repeat, not a promise, an actual

promise, by responsible government officials to provide that amount of funding. I referred earlier to an analysis I recently read which was prepared by the staff of SLAC on high energy physics and the President's 1972 budget. There is also in that particular analysis the following statement,

"There is an enormous disparity between the actual funding of high energy physics and the planning assumptions which were made when those high energy laboratories now operating were created."

That curve that we are describing had a rise of about 8.5 percent a year or a doubling time of about 8.5 years. Very few reasonable people here tonight, I think, expect that the government is going to be able, over the foreseeable future, to come up with the sums of money that would be needed to sustain that kind of growth. The federal government today is supporting, I believe, about 15 accelerators--king-sized accelerators, in terms of energy--as well as dozens of others with lesser energies. Let me ask this question--do these large machines need a major overhaul, do they need a beam intensity doubling, or energy increases, or bigger bubble chambers every three or four years? It's nice, of course, to have the very best equipment, but does everybody really need the best?

What I'm saying can best be summarized with this thought: We've heard much in the last couple of years about the need to reassess our national priorities. It seems to me that the very hard and difficult discipline of establishing the most urgent priorities in this very important field that we are talking about tonight is going to be just as necessary as it is elsewhere in the field of government finance.

I was at hearings just last week where we were trying to ascertain jointly with the Senate Science and Astronautics Committee why the Office of Management and Budget, formerly the Bureau of the Budget, had cut a combined AEC-NASA request for 110 million dollars for a nuclear rocket engine research project back to 30 million dollars. The residue after what amounts to a 73 percent cut was billed as a keep-alive budget. I, personally, have serious doubts as to whether the NERVA program can survive the kind of radical surgery that was performed in the fiscal 1972 budget. But I mention it for the same reason that I earlier spoke of the Princeton-Penn Accelerator. Because in these very trying times that we are going through, an unusually high budget request may backfire and prove to be totally counterproductive. Similarly, I think, to try to tell the Executive Branch, the people in the office of OMB, or the Congress how much they "owe you"--I go back to that statement based on the 1965 hearings and the program for high energy physics that was proposed at that time. That kind of talk, to put it very bluntly, is also going to prove to be counterproductive. I'm obligated at this point, I

think, to indicate that there are some who would in every instance blame the Congress or the Executive Branch for the condition in which scientific research finds itself today.

In the article by Mr. Greenberg, to which I referred a moment ago, he said that

"Nevertheless, the phenomenally rapid position growth of science in the United States did, as a matter of fact, take place in a fashion that produced a variety of extremely undesirable side effects. In my view, public authorities, particularly the U.S. Congress, bear more responsibility for this than does the scientific community. The worst that can be said about the scientists is that they vigorously exploited their opportunities. But it was the politicians who for a long time left the door to the candy store unguarded; it was the politicians who gave science a privileged access to public funds without first insisting upon an examination of the implications for the rest of society."

I, for one, tonight would say, "Mea culpa." I think that all too often we in the Congress have been, if not totally, at least far too oblivious to what some of the consequences of our actions in this area would be. Let me give you a concrete example. We have not faced up to the inadequacies of what we were doing to fund the needs of higher education--all you have to do is look at a document like the Carnegie Commission report and find that two thirds of private colleges and universities in this country today are in dire financial straits. Even those most prestigious institutions with the largest endowments are looking very nervously and very anxiously to the future. But what happened? We on the federal level, instead of really coming to grips with the basic problem of what was wrong in this area, have permitted research, scientific research, to become the vehicle for pouring financial federal aid into the university system. Dr. Handler has said that

"Our national apparatus for the conduct of research (and I quoted this earlier) is not yet dismantled, but it is falling into shambles."

Well, Dr. Handler, back in 1965 took a somewhat different view of the situation. He put the problem in a somewhat different context, because in October of that year the Research and Technical Program Subcommittee of the House Committee on Government Operations issued a report entitled, "Conflicts Between the Federal Research Programs and the Nation's Goals for Higher Education." In that particular report, you will find a fairly lengthy quotation from Dr. Handler which he sent to the Subcommittee on the question of the diversion of qualified scientists from the classroom, and he said this:

"Were we to abandon the space program, there would become available for employment on college faculties a great number of physicists, chemists, biologists, engineers, astronomers. If we are to continue the space program, then we must learn how to operate our educational enterprise without the service of this source group."

Now it seems to me that we are seeing both sides of the research coin. The Congress has been faulted for being too generous with research dollars, and then when the flow of dollars starts to slow down, we are faulted once again.

I certainly don't want to indicate tonight that I am totally pessimistic about the future of the funding of scientific research as far as the federal government is concerned, because I think that we have learned something from what we are now experiencing. I think, also, that we have had some rather inspiring examples. I could pick out at this point the examples provided by a couple of men who are seated here at the speaker's table with me. Louis Rosen is a man whom I would cite as an example, a man whom the Joint Committee has had to pick up and put back on the wall several times, but he doesn't shatter very easily, as those of you who know him, I'm sure, will recognize. And so he has brought the Los Alamos Meson Physics Facility down the road as rapidly as funding would allow. The spin-offs from that facility are already beginning to pay off. The prototype electron wave guide that his team developed as a precursor to the proton device has been adopted by industry for manufacturing and for use in hospitals.

An even more important function will be the ability to use negative pions for cancer therapy when the treatment facility is built. I understand that by using only a small part of the beam, a few minutes treatment can provide the required dose to a deep-seated malignancy without affecting neighboring tissues. Such treatment may be accomplished without disturbing ongoing physics and other experiments.

Let me mention another man who honors us with his presence here tonight, Dr. Wilson of the National Accelerator Laboratory, and I say this again in the spirit of "Mea culpa," considering the short-changing that he has received almost every year since he agreed to take on the task of putting the National Accelerator Laboratory together for the Atomic Energy Commission. He has promised us, as I understand it, a beam that will be on target about a year earlier than had been originally expected. That in itself is an outstanding achievement. But I consider just as important his efforts to train the unemployables from some of the hard-core poverty areas. I would also mention that particularly in this stage when we are so ecology-

conscious that it's my understanding his team has invented a new building material that at one and the same time gets trash out of the environment and still saves money for the laboratory. A new honey-comb material was developed using two pieces of clear plastic separated by beer cans with both ends removed, an end product that I understand is structurally strong and casts almost no shadows. If that isn't a prime example of true Yankee ingenuity, I don't know what is.

Let me conclude with this thought. I think those of us in Congress recognize that the federal government is certainly going to have to continue to be the primary source of support for the kind of basic scientific research that is represented at this great laboratory and at others across the country. I believe that without an adequate research effort, one that is adequate as to quality and to quantity, our nation, as we know it, could well perish. So, accordingly, we cannot afford to make any big mistakes in our decisions on government support of research.

Reluctant as I am to say it, I think that at least some of the errors and some of the decisions concerning the support by the federal government of research have been the fault of those who have proposed them and who are ultimately responsible for carrying out that research.

As you know, over the years a number of decisions have been made cutting out complete research programs after a great deal of work has been done on them and exceedingly valuable research is already in progress. We in the Congress have found on numerous occasions that the decision to phase out a particular program had been made by personnel in the budget business without anybody being present who had the professional or technical talents to appreciate what the specific research project was designed to do, without anyone actually being there at the critical moment in the decision-making process in a position to defend that specific project.

You could ask, "How could that possibly be my fault?" My contention would be that as a community, as a scientific community, I think you have to recognize that that kind of a vacuum in the decision-making process, one which permits a decision to be made without the proper inputs being there, is something that you would have to assume some responsibility for--you have to be interested in correcting that situation--if you are really interested in putting the funding of scientific research on the proper basis. Both last year and this year members of the Joint Committee met with representatives of seven university associations, to which some 160 of the better known institutions of higher learning in our country belong. It seemed to those of us on the Joint Committee that at those meetings we had the feeling that the collective muscle of these associations was not being used, at least it was not being used

to achieve the most effective kind of communication with people like the President's science adviser and the science adviser's staff. I don't have to remind you of something as elementary as this--research fund requests which come to the Congress in the form of an item in the President's budget are usually the things that get preferential treatment. If the Congress unilaterally attempts to add funds for research and development to a given authorization or appropriation bill, that money may never be spent even if it is successful in adding those funds. If the budget people, in other words, hold back the funds initially, those funds, in many instances, are as good as lost, whereas if they show up initially in the President's budget request, then there is a certainly far better chance that those funds are ultimately going to find their way into your scientific research project. At least that's the way we operate by and large in the House of Representatives.

Let me make one final observation. We are all aware that there are competing requirements for the budget dollar. This is a fact that is brought home to each of us when we are faced with the fact that a particular line of effort that we believe worthwhile is not supported to the extent that we deem desirable. But the needs of the poor, the needs of the handicapped and the sick are also needs that have to be met. And the decision makers need to be provided with the kind of data that can show the importance of maintaining our scientific primacy and that it's important, not just as a matter of prestige--I don't think we can go back to the old Sputnik era wherein for a desire merely to maintain prestige you're going to find the Congress willing to pour millions and billions of dollars into a particular scientific area. I think because of the competing social needs that confront our society today, we have to be mindful of

the necessity of establishing some clear link between what we are doing as scientists and these unmet social needs in the community.

I think this whole idea was pretty well summed up in some testimony that I have extracted from hearings that were held before the Joint Committee on Atomic Energy. This particular testimony is represented in an exchange that took place between the man who was then Chairman of that Committee and Dr. Wilson:

"Senator Pastore. When you consider priorities, I know exactly what you mean, provided we have the money.

After all, when you have people who are hungry, the big question here is: Is it more important to put a man on the moon, or to fill the stomachs of our starving children?

Dr. Wilson. It is most important to fill the stomachs of our starving children.

Senator Pastore. You would put that as the first priority, would you not?

Dr. Wilson. Yes, sir.

Senator Pastore. Of course.

Dr. Wilson. But it is also important to get on with the things that make life worth living, and, fortunately, it is possible to do these things in a manner which also contributes to the feeding of hungry children.

As I read those words in preparation for these remarks tonight, it occurred to me that there would not have been a green revolution, the revolution that holds out promise for feeding the otherwise starving millions of our world, if there had not first of all been scientific research. Thank you very much.