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DR. SEITZ: We are very fortunate this morning in having several distinguished Congressmen join with us for discussions of matters affecting science in Government: Representative George P. Miller, Chairman of the House Committee on Science and Astronautics, and Representative Emilio Q. Daddario, who is Chairman of the Subcommittee on Science, Research and Development of the Committee on Science and Astronautics. We are expecting Mr. Jeffery Cohelan, a member of the Subcommittee on Research, Development and Radiation of the Armed Services Committee, to arrive shortly.

First, we shall ask the Congressmen to speak about their own views of current relationships between science and the Government, and then throw the meeting open for discussion, hoping that, between comments and questions on both sides, we can evolve a clearer understanding, this being, of course, one increment along the road.

You will recall that, prior to 1939, science and, in fact, most of technology, were not of Federal concern. The one great exception was agriculture, since the Federal interest in promoting agricultural research and technology in a major way went back a century. Most of the sponsorship and support for science and technology came either from private industry or from the states. The picture changed radically with the advent of World War II. There had been a somewhat similar change at the time of World War I, when the National Research Council was created, but that was transient. When we returned to the normalcy of the twenties, the pattern that had been in effect before 1914 was, for the most part, resumed.

The situation that brought about the change in World War II, in which a number of factors joined together, was, in part, accidental. Some very wise scientists and engineers were in prominent advisory positions relative to the Executive Offices and to the Congress. They realized the importance of the role that scientists and engineers played in the Battle of Britain—how it would have been impossible to win that battle in the spring of 1940 had scientists and engineers not been given a relatively free hand in directing the course of affairs.

A group of advisers of President Roosevelt impressed him with the fact that the time had come to do something new and radical—making science advisory to the Government through the crises. The President was receptive and the active committees of Congress were willing to go along. We saw the creation of the Office of Scientific Research and Development, which played a major role in establishing the pattern. Once the pattern was established, the military services were receptive to it.

Looking back over the history of that period, however, I am inclined to feel that it required initiative from the Executive-Congressional side to get it going—that it would not have gone as well or as rapidly had it depended entirely on the military leaders, although, as I say, once the pattern was established they accepted it. This all might have died at the end of World War II as it had after World War I, and we might again have gone back to the older pattern had it not been for several new factors.

First, Vannevar Bush wrote a very interesting book, Science—the Endless Frontier, recounting his experiences and those of his colleagues, and voicing a note of hope for the future if the nation, acting broadly and through the Federal Government, were to focus its attention on the influence of science and technology. Coupled with this, the Soviet Union decided to take maximum advantage of the impetus that it had gained through its own victory in the war, in turn making the free world uneasy, so that there was no incentive to terminate the military aspects of research and development.

Second, Congress, realizing that we had arrived at a time in our history that called for more attention to factors affecting public health through research and development, began to support those governmental agencies concerned with public health, particularly the National Institutes of Health.

Third, two new major weapons systems appeared on the horizon—weapons systems so terrifying that it was clear that we could

not ignore them. I refer, of course, to the hydrogen bomb and ballistic missiles. It became necessary, if we were not to find ourselves in a desperate position, to do all that we could in research and development in these two areas. That added further reasons for the continuation of the support of science.

Finally, it began to appear, with the discovery of new uranium sources, that useful atomic power might lie at hand, and the Atomic Energy Commission received support over and above that needed for the weapons area. More recently, the potentialities of space research and the importance of new science for national prestige appeared, and we had another thrust. Between 1940 and 1963, the funds for research, development, testing, and evaluation were essentially doubled every four years. The vast proportion of money—eventually about $15 billion a year—went into quite practical things, that is, testing and evaluation; but a significant amount, on the order of $1 billion, went into basic science—both pure and applied—and was distributed through a number of agencies.

One wondered how long this pace would continue. I recall that I sat down about a year ago to prepare a talk on the situation concerning the relationship between science and the Government for delivery last June at the annual meeting of the Industrial Research Institute in San Francisco. As I looked over the mounting costs, the rate of growth, the projections, I felt that some time in the coming five years it would be necessary for the country to analyze the situation anew in cooperation with the legislators.

I discussed this with George Kistiakowsky. He said, "What makes you think it is going to take so long?" He was right. He had a much better intuitive feeling for what I might call the growing crisis in Government-science relations.

Of course, as you know, the situation came to a head last summer when there was a call in the House of Representatives for the creation of a committee to investigate the support of scientific research. This led to the constitution of the Select Committee under the chairmanship of Representative Elliott. We had hoped that Mr. Elliott could be with us today, but he has been far too involved in the work of his committee. We are fortunate, however, in having a member of his staff here—Mr. Naftalin—who, I trust, will join in the discussion a little later on and give us a few words concerning the work of his group.

I would now like to call on you, Mr. Miller. I think you have a very receptive audience.

MR. MILLER: Dr. Seitz and members of the Academy, it is with fear and trepidation that I, a layman, approach the task of speaking to scientists. I think Dr. Seitz has related well the history of what has taken place between Government and science, and many of you are familiar with it because you have been part of it. I dare say everyone here has participated in some way in these advances.

Unfortunately, there are those in the country who feel that there is still a lot of alchemy connected with science, that you can lay on hands, and that through the medium of science we can solve all problems. Then there are the skeptics who refuse to believe that you can do anything that has not been done before. They don't know how things were done before, but you must never depart from the old pattern. We find this in Congress.

We glory in the success of science and the developments for which it has been responsible. We are perfectly willing to extol the work of the Atomic Energy Commission—Dr. Vannevar Bush, General Groves, the people who pioneered—the Lawrences and the rest of them in this field, but we don't know whether we are justified in spending money going any further—whether we haven't reached the goal.

We give great newspaper publicity to orbiting the earth; the radio and television people tell us that they concentrated more media at Cape Kennedy, for the Glenn flight, than had ever been put in one place before. But then we say, "What is the good of going to the moon?" Going to the moon is something that the average layman can understand, and it is easy for the news media to pick it up. So they say we are going to the moon.

I don't have to tell you, of course, that we are going to go to the moon, but going to the moon is not the objective. It is the exploration of outer space, and what we learn here we will apply to other things. People ask whether this is worthwhile, and why can't this money be diverted into channels of health or education, housing—the welfare of the people. I have been in legislative life for a little over 25 years, both in state and national Government—90 per cent of it in the national Government—and I have not seen the time when funds refused an agency were ever diverted to another agency because the second was a good agency and could do things to help humanity.

Now, we all want to balance the budget and all want to keep away from spending; but this is where we find ourselves: This great complex that Dr. Seitz mentioned is dumped into the lap of some committees of legislative laymen who do not have too good a background, who don't understand it, but who have to go ahead and pioneer.

My committee of 25 on science and astronautics was appointed six years ago. None of us had any particular background to qualify us for the committee. In the beginning I was chairman of a subcommittee that was assigned a great part of NASA's budget. The back-up books came before us, the books that the agencies submit to justify their requests for money. We started to read them, and one of the first things I saw was a request for a vacuum chamber with cryogenic walls, which could produce a hard vacuum of ten to the minus ninth. I asked the people before me what cryogenic meant. I graduated from college as a civil engineer in 1912, and we never knew this word. I said, "How long will it take to get a glossary of the terms?" They said, "We can produce it in 24 hours." I said, "Fine, the committee is adjourned. Let us get a glossary." And we still have to have a glossary; we still have to have an interpretation, and NASA has now published a book containing the scientific terms they use.

Congress is jealous of its prerogative to appropriate money. When they are confronted with this sum of $15 billion, the assumption is there must be duplication. There is always duplication. We have to get at the duplication.

I happened to sit on the Elliott Committee, which is the Select Committee on Government Research. Mr. Fogarty, who handles the money for the National Institutes of Health as chairman of the appropriate Subcommittee on Appropriations, and Mr. Price and I are members of this Committee. This gives us a tie-in with the Committee so that we know what it is doing. Thus, we can help it and it can help us.

Where are we going in science? There are science advisers in the three Departments of Defense, a science adviser in the Office of the Secretary of Defense, and a science adviser in the Department of State. We also have science attachés. We sent a very competent man to Sweden, where he is in a position to do great work. We ask him to cover all the Scandanavian countries and Finland, and then we give him $700 a year to travel on. We have quite capable science advisers in the Department of Commerce and the Department of the Interior. Of course, Interior always has

had more of an understanding of this because of the Fish and Wildlife Service and other services with scientific backgrounds.

But where and how do we coordinate? How do we know what the agencies are doing to avoid duplication? Where do we go? I had the privilege of being the first chairman of the Subcommittee on Oceanography of the Merchant Marine and Fisheries Committee. This was brought about by an outstanding report by the Academy of Sciences under my good friend Dr. Harrison Brown. I did not know much about oceanography. I came from California, and prior to coming to Congress I was Executive Officer of the California Fish and Game Commission for four years, which allowed me to rub shoulders with fisheries biologists, ecologists, and engineers, and we were greatly concerned with water. I didn't know too much about the ocean. In our studies of this field we found that oceanography and the several diciplines in it were scattered throughout seven agencies of the Government, and no one knew what the other agencies were doing. If you wanted to find any particular information you had to run around to all seven agencies. Senator Warren Magnusson and I introduced bills to set up a coordinating center for oceanography. Before our bills were through committee, Dr. James Wakelin, Assistant Secretary of the Navy, and an inter-agency group that we had set up took over oceanography activities.

We achieved a coordinating center. Then we managed to have a calibration center. Now it is running very smoothly except for the fact that, when you go to the Department of the Interior and you want some money for the coordination center, the Secretary and the people who distribute money in Interior may be very restrictive.

The United States Coast Guard would be a natural in this field but has nothing in its charter that allows it to go into oceanography. It was reluctant to do so because it has to look for its money to the Department of the Treasury, and the Department of the Treasury is not very concerned with oceanography.

Nevertheless, we succeeded in placing the Coast Guard into the field of oceanography. There is no reason why the great Coast Guard Academy at New London, Connecticut, should not become one of the greatest oceanographic centers in the country.

Where are we going to go from here? We are going to require assistance from you, the Academy of Sciences, who are most concerned by virtue of the nature of your organization.

The Committee on Science and Astronautics places science first. Initially, a $1.3 billion appropriation was dumped into our laps for authorization, and then $3.7 billion, and last year approaching $5 billion and this year $5.3 billion. It takes a lot of our time and effort to learn the terms of the glossary to talk to NASA. It is almost a bigger job than the Armed Services Committee has to handle. We have responsibility for all facets of science. We have jurisdiction over the National Science Foundation and over the Bureau of Standards. It is time that we in the legislative branch of Government enlisted your support to see how best to succeed in this field.

I would like to tell you the answers. I don't know them. A very competent member on my committee sits beside me and, like any good administrator, I said, "Mim, this is your child." I will take all the kudos. He will do all the work. He first discussed with Dr. Seitz how we could enlist your services. I am happy to be here to help clarify our position, and to get your reaction to some of the problems that laymen, and particularly politicians, have to deal with in the disciplines of science. Thank you.

DR. SEITZ: Thank you very much, Mr. Miller. I will now call on Mr. Daddario.

MR. DADDARIO: Dr. Seitz, Chairman Miller, members of the National Research Council. I was happy when, some time ago, Dr. Seitz asked us to participate in this meeting, which had been scheduled some months ahead so that we might continue what we felt to be an important piece of work—to create a better understanding between you who are the members of the scientific community and us. We must act on programs which are of interest to you, and determine the facts around which the policy of the nation can be established and especially as it affects the level of support for science.

The fact is that last year we came to a sort of crisis so far as budgeting was concerned. There was a great deal of activity whenever scientific portions of budgets were presented to the Congress. For some time, we on the Committee of Science and Astronautics, although not having established a particular committee to take care of the science problems of the nation, had constantly run into these problems. So Chairman Miller determined that we ought to have a subcommittee for this purpose, and he formed and named the Subcommittee on Science, Research and Development.

The elements which showed themselves at that time were these: the violence of the debate on the space budget last year; the arbitrary cut of the funds the National Science Foundation had asked for and which we believed to be important to it in the performance of its responsibilities.

I bring that up not to argue the merits of the trend which appeared to be developing but to show concern that such an overall arbitrary attitude, if followed in other areas, could affect scientific research and development throughout the country. Because Chairman Miller believed this to be of importance, he created this committee, and we immediately got to work. We contacted Dr. Seitz, Dr. Haworth, and other members of the scientific community to work with us.

We have had hearings which have already been published. The contents of these are, I believe, of great value to us all. I have re-read the hearings on several occasions, and on each reading I find a whole new chain of thought developing. But the hope is that we can establish rapport with the scientific community in all places so that we might get better advice, and thus be able to establish facts to assist us in the decision-making process. As we do this it should eventuate that the other members of Congress will recognize, first of all, the seriousness and the depth of the support which there is for this program which will in this year's budget reach the $5.3 billion mark; so that it can be understood that there is a proper inter-relationship of activity and thought; so that overlapping duplication will be reduced to the lowest degree possible; so that we might feel that what we are doing is adding to our knowledge and understanding. It is my opinion that we have made great progress in this direction. We have hopes that the work to be done for us by the National Academy will be of help to us. We have similar hopes concerning the management of our scientific programs as a result of informal discussion with individuals of high competence in this area.

I think we have a better understanding as to the importance of basic research than we had before Mr. Miller formed the subcommittee. There appears to be agreement that we should do as much as possible in this area and that we certainly are not doing more than we should at the moment; that we can develop an applied research program which can take care of the country's needs; that we must have strong development programs, but that within the development area and the applied area, too, there can be better selectivity.

This is important because, as we have talked to people they have asked us, "Is it possible for the scientific community to be objective about itself?" I believe that it can be. I think that has been demonstrated many, many times over the course of years, and it certainly has been demonstrated in a most forceful way in the activity during this past year.

But it is important that we bring this together in such a way that it can be better understood: so that when we talk about selectivity, we can understand what we really mean by it; so that we can show within the scope of this entire budget that programs are being properly supported, that we are not overlooking the less glamorous areas where it might be important for us to have a higher level of support; so that we might be able to overcome the problems created by those large programs in the development area which have cost the country hundreds of millions of dollars and, in some areas, a billion dollars or so; and so that we can develop better techniques of choice of priorities important to the nation, and better techniques of management of those programs once they are under way.

I need only refer to such programs as SKYBOLT, which we have recently scrapped; DYNASOAR, which we have cut out after an expenditure of some $500 million to be replaced by the manned orbital laboratory program which has been estimated to cost somewhere in the order of $900 million—other estimates ranging from a low of $500 million to a high of a billion dollars; and to a multitude of others. At other levels, the importance of tying together our capabilities has been shown in one area, as NASA and the Department of Defense have worked out a joint medical program which indicates great promise both as to that field of activity and as a model for others.

There have already been results. I think it is important that this year, as I have already mentioned, the Department of Defense and NASA have come together and have submitted the joint medical study. It is a meaningful stride ahead, and the kind of program which, in my opinion, gives confidence to our committee, to the rest of Congress and, as it is expanded in other directions, to the nation as a whole.

As Congressman Miller has said, the Committee on Science and Astronautics has been involved in a major way with the development of the space program.

We have seen it grow—all of us—to the point where it is now a program involving the expenditure of some $5 billion-plus. As

a result, other areas of research and development have not been looked into in depth, and questions have arisen as to the amount of expenditures and the resulting effect on the nation as a whole.

The geographical distribution of funds has been raised and questioned. The argument came up in some degree when the Manned Space Center was established at Houston, and has continued through various developments since that time.

The need of developing areas of academic excellence throughout the country is still part of the argument. What standards do you use? Do you look for quality only, or do you attempt to build up the capability of areas not now of such high quality but which, through the assistance of such programs, can develop a capability? This is an argument, of course, which will go on for some time. It will probably never be satisfied completely, for there is so much that can be done. But a better understanding of the facts and a closer relationship between the Congress and the scientific community can prove helpful.

We have recognized that we are at a crisis—a crossroads, so to speak, in our science research and development expenditures. We need to do something about it. I think we have taken the steps, and I hope we can do more, and I want to assure you that the Congress is desirous of establishing the best understanding possible, recognizing that this is of utmost importance to the nation.

We are convinced that the strength of our country does depend upon what we do. We have already established certain procedures which have been helpful. We have strengthened the staffs of our committees. We have made better use of advisory groups. There has been better liaison between the committees of Congress on both sides, and especially a better understanding with the Space Committee of the Senate. Thus there has been a closer relationship, a better use of the knowledge available, a better understanding of the objectives and as a result, I hope, also a better feeling and better spirit within the community at large.

The days ahead will be important to us. As a result of the activity which has taken place, we have already issued two reports, the second of which shows the funding of this program and where the money is being spent. It shows pretty well that the disciplines at all levels are getting support. There can be argument, perhaps, as to what levels of support these should attain in the time ahead, both upward and downward. This is really the objective of the work we are trying to do.

We hope, too, that in the course of this we might not only continue to bring better order to things, but also we might be able to get support in the social and behavioral sciences, which can be extremely helpful in these troublesome times to the nation as a whole.

This is another element of the issues involved in the dialogue which is taking place. In substance, it seemed to me that, for our purposes here, I should touch on these particular points, looking to the time ahead when we can create a better instrument through which the facts can be made available to Congress—so that in the final analysis we can make the decisions which it is our responsibility to make, and so that we might open up the opportunity for discussion.

DR. SEITZ: Thank you very much. I think two matters are quite clear. First, that there are Representatives in the House who have quite a clear understanding of what science means and can offer our society, and how essential it is that this process be continued. Second, it is also clear that we are now entering into a new period of analysis in support of different areas of science and that there will have to be much more selectivity because of the variety of factors that enter into these decisions.

The scientific community will have to play a role in this process of decision, in the sense that it must be prepared to stand by and give advice to those who feel they need it and want it. We can be fortunate that there is a doorway open whereby this advice can be delivered in a rational way. Before calling for questions and discussions, I might ask Mr. Naftalin, who is on the staff of Representative Elliott's Committee, if he would care to say a few words to us or would rather wait until later.

MR. NAFTALIN: Thank you, Dr. Seitz, Chairman Miller, Mr. Daddario. Let me speak briefly about the Committee on Government Research. I think Chairman Miller, who is also a member of our committee, has covered it amply already. I will say just a word or two, however.

The Committee, as you know, was created in September. I think the fact that it was created unanimously indicates, as well as any fact could, that there is a consensus in the House that the Congress needs to devote more attention to the problems of science in Government. It is quite unusual to get anything through the House unanimously. I believe one of the landmark unanimous decisions was the creation of your committee, Mr. Miller—is that correct?

MR. MILLER: Yes.

MR. NAFTALIN: And also the creation of NASA was a unanimous decision. I don't recall too many since that time.

We feel at least that we have some advantages that the permanent standing committees do not have, in that we are not burdened by, for instance, the $4 billion or $5 billion budget. We don't have to worry about the authorization problems that Mr. Miller's committee has. The House was good enough to give us an ample budget to hire as broad-gauge a staff as we need.

Basically, we have decided on a program of 10 rather academic-type studies. I use the word "academic" as contrasted to what I believe most people would conceive of as a Congressional investigation. We don't see this program as primarily an investigation, but there will be aspects of that as well.

Our main goal is to look at research, development, and science in the Government as it cuts across Government agency lines, looking at the interagency aspect particularly. We conceive our role to be one in which, if we find problem areas that are limited to the conduct of a program within a single agency, we should turn that information over to standing committees who have legislative-oversight responsibilities.

We are charged in our enabling resolution to coordinate with existing standing committees, and we have been making an attempt to do that as much as possible. We have a close working relationship with Mr. Miller's staff and with Mr. Price's staff on Armed Services (Mr. Price is also a member of our committee); with the House Interstate and Foreign Commerce Committee staff, and—down the line—with the Joint Committee on Atomic Energy.

We have come out with one committee print, a preliminary report called the "First Progress Report," which outlines in detail the 10 staff studies we are planning to do. We have bitten off quite a big chunk and, as those of you have read Science magazine know, Greenberg indicated we would be lucky if we got one of them done.

But we are looking at problems on an interagency basis, working with the Academy and with other representatives of the scientific community, with the agencies and with the standing committees. I think that is all I have. Thank you.

DR. SEITZ: Thank you very much for these clarifying remarks. Mr. Cohelan has managed to break away from his office and is prepared

to say a few words. He is a member of the Subcommittee on Research and Development, of the Armed Services Committee.

MR. COHELAN: Mr. Chairman, distinguished guests, and my colleagues, I want to apologize for being late. As you know, I am substituting for my subcommittee chairman, Mr. Melvin Price.

I think it might be worthwhile to discuss for a moment how this subcommittee came into being. The Armed Services Committee of the House of Representatives is a 37-man committee which deals primarily with matters of military procurement, the general military posture of our country, and the provision for its military forces. As many of you well know, the research and development aspect of this has been a growing part of the activity of our committee, to the point where at the present time it is something in the order of six billion dollars.

There has been some concern among many members of Congress that this was more or less an unmonitored section of our activity, and it was felt by many that there should be a more careful scrutiny of the work that was going on here. This is reflected by the fact that the Select Committee on Government Research has been set up by the Congress, and my good friend and colleague from the same California county, the distinguished Congressman, George Miller, is a member, as is Congressman Price. But these members are on the committee which is undertaking the broad task of examining Government policy in relation to research and development in all of its aspects.

May I say, as a member of the Armed Services Committee for the last five years, that I have been among those who have felt very strongly that we should have in the Armed Services Committee a Subcommittee on Research and Development. It would be nice to be able to claim that this feeling was the cause of the adoption of this committee, but the pressures, I am sure, came from other sources. In any event, our great chairman, Mr. Carl Vinson, was finally persuaded that there should be a research and development subcommittee, and last year it was set up on a permanent basis. I personally am very proud to serve on this subcommittee with the many able men from both sides of the aisle.

In the last session of the Congress, we undertook to make a line-item survey of the broad range of research and development activity in the Armed Services. This was no small undertaking. But despite the great pressures on our time, there were enough of us who felt very deeply about this subject, and who were just plain

curious about some of the many fields in which we were doing very serious work, to make the Committee most active and effective. The findings and the results of our activity, I think, bore fruit.

The approach this year to our research and development activity, in an environment of budget cutting, was most interesting. Our committee chairman suggested that it might be well for us to cut a billion dollars from the research and development work. As we got into it, we found that this was not possible, and we reduced activities by only some $362 million. However, we permitted the military departments to re-program, or we gave them maximum flexibility, so that in those fields of activities which they regarded as essential, they would not be inhibited by some of the cuts that we did make.

You may also have read about the battle the general committee had over a follow-on bomber and an improved manned interceptor; and you will be reading more about both of them. Some of us opposed the funding or authorizing of this particular activity because we already had a certain amount of money in the budget for studies of this nature. However, the House prevailed, and they put in some $52 million for follow-on bombers and another $40 million for the improved manned interceptor, which meant that our $362 million was reduced by that much. I am pleased to report to you that the Senate, in its wisdom, cut out the improved manned interceptor. We have all been pleasantly surprised, of course, to learn of the progress of the A-11.

I might tell you that I have some great concerns in this research and development field. I think, generally speaking, that we are using too much of our national scientific and engineering manpower in the area of national defense, critical as it certainly is. I am very familiar with some of the studies that have gone on in the manpower field, not the least of which are those by my good friends, Professor Arthur Ross of the University of California, and Mr. John H. Rubel, formerly the Secretary of Defense for Research and Development, who wrote a very excellent paper, which I commend to you, on trends in research and development.

I think both show that in the defense area we are probably making too great a claim on talented personnel, and that there is a great sacrifice made in the private sector of the economy in non-defense-type activity. I think our universities and colleges are in some jeopardy because of these trends. One of the very impressive figures in Rubel's paper, as I recall the curve, shows that some 53 per cent of our activity in the hardware field yields roughly

about a 3 per cent so-called "spill-over" into the general economy, whereas an equivalent effort in research and development in such areas as food and kindred products yields something in the order of 53 per cent. This kind of problem needs to be examined even further.

Another point of great importance is this: I have examined the distribution of activity in the field of research and development in the military field, and I feel very strongly that we are neglecting the behavioral sciences.

Some of you may remember the great American sociologist and economist, Thorstein Veblen, who in 1939 wrote a paper, "Imperial Germany and the Industrial Revolution," which predicted roughly the axis of Japan and Germany. I often wonder, as I examine some of the overseas research and development that we are doing, why we don't do more in this field. We seem to confine our work to the physical sciences and, even though I believe this will always dominate our efforts in research and development, it raises some very fundamental questions. Why don't we try to learn more about why people behave the way they do, and how they do behave?

I feel there is a prejudice against the social sciences. I would make a plea that we give a little more to this area because, with the well-recognized exponential acceleration of technology, we had better learn how to live with what we are producing in these other fields.

I am very pleased to have this opportunity to be with you this morning, and thank you very much.

DR. SEITZ: Thank you very much, Mr. Cohelan. We will now call for questions or discussion.

FROM THE FLOOR: I would like to ask Mr. Daddario whether he thinks that the Federal support of science is a problem which is basically of the same nature as the Federal support of public health, public roads, and agriculture, or whether there is anything about these awards to science which set it apart. I ask the question not to make a special pleading for science, but only to seek information.

MR. DADDARIO: I think there are elements in the support of science which do set it apart, and I think particularly in the basic area. We must understand, and I think we in Congress do understand, that it is from this that we derive our understanding and knowledge around which other programs can develop. I think there is no doubt

that the support given science is dealt with in a special way by the Congress. The fact is, however, when you do get to the point where questions are being asked as to the whole level of support, that the standards by which it is judged come to be the same standards as those by which the other programs are judged. Recognizing this, it is important for us to do what we are doing: that is, to explain it better, establish the requirements of necessity, and show why it is special and why different standards need to apply. I would hope that, over the course of time, we might develop a formula that would allow us to have a strong basic research program which would not be the first affected when cuts take place, that we might look further into the field of applied research so that better order could come about, and that we could have better selectivity of programs in the development areas.

DR. SEITZ: Is there another question or comment?

QUESTION: I would like to ask Mr. Miller whether he believes that the current trend toward competitive bidding in research and development is inexorable and should be furthered, as against the more traditional method of evaluating proposals in research and development on the basis of excellence.

MR. MILLER: It is very hard for me to conceive the time when we will be able to send out bids for research and development the same way we send them out if we want to buy pencils. I think we always have to have the flexibility of doing this work in more or less the traditional manner in which it has been done. If we knew all the answers we would not have to have these development projects. It is because we don't know the answers, and we do not know the road we are going to follow to get there, that we have to have the flexibility about which Mr. Daddario and Mr. Cohelan spoke. It is true that, as we go along, there may come a time when we can be a little more specific in these things, but still we are in this field where the personality of the man doing the work, and the people he is working for, play as much a part in it as, perhaps, the accounting for dollars.

QUESTION: I wonder if any of the Congressmen would care to comment on any alternative mechanism being proposed?

DR. SEITZ: The question relates to whether or not the Elliott Committee has a specific plan for providing continuous exchange of information between the scientific community and Congress.

MR. NAFTALIN: I think the best way I could answer that is this: As you all understand, we are a new committee. We did not get into operation really until early October. Clearly, one of our goals is to arrive at some recommendations to the Congress for solving various problems that we identified. We are not a legislative committee, so that the most we can do is make recommendations—not introduce legislation per se. We are aware of that problem, clearly. We are aware that some recommendations will have to be made to meet the problem of how the Congress informs itself about scientific problems.

This is not our problem alone. Mr. Miller's committee and many other committees of Congress are also looking at this question, but we, too, will be looking at it, and the best I can say is that it is premature to say we have a plan.

MR. DADDARIO: I would like to refer to that for a moment. I did mention in my preliminary remarks that the House Committee on Science and Astronautics had come to an understanding with the National Academy of Sciences so that certain work might be done for it. It is the chairman's idea that this not be a short-range understanding, but that, through it, we might develop a continuing relationship because, as we look down the road ahead, we believe that the problems will become more complex and it will become more necessary for us to establish this relationship. Beyond that, it seems to us that it is a normal thing for us to do. We could not possibly build up the necessary competence in our staffs to handle this in a short time. This is the logical way to approach it. We have begun to make better use of our advisory committees, and it is our hope and our intention that it will continue in the time ahead.

DR. SEITZ: I might say the Academy-Research Council is looking forward to this opportunity with very great anticipation.

MR. MILLER: One of the first things that the Committee on Science and Astronautics did was to establish a panel of consultants. This has been successful. It is a bit unwieldy. It is hard to bring eminent people to Washington for short periods; thus the scheme that Mr. Daddario just mentioned has developed, to give us continuous communication with the Academy of Sciences, and we can invite you to sit with us and help us.

Other groups, research institutes—all these things concern us. I am very happy that we have taken this first step, because I feel that this will be a continuing effort, and that it is only through

the years that you will get to know the problems that confront Government and get a better understanding of how Government must function in these areas; and we will learn some of the problems that you face. I feel that the dialogues that will take place in this field will be a great advance in the relationships between Government and science, and I am very happy to see that this has been undertaken.

QUESTION: Chairman Miller, in this relation between science and the legislative branch, do you think the individual professional societies should take a closer interest in the problems facing you, or is it better for them to work through the National Research Council, which cuts down the number of people but also covers it?

MR. MILLER: Working on the general scheme about which we have been speaking, it does cut down people if we work through the Research Council. On the other hand, as we begin to develop and work out this thing, we have to be a lot more specific and get down to a lot more detail, and here is the place, I believe, where the contracts with the individual societies and the individual disciplines are going to be important and essential. So I think they can work very closely together in bringing this about.

DR. SEITZ: We have the good fortune to have in the room one of the men who, in the course of the last 30 years, has been most effective in the development of relationships between the scientific community and Congress from the standpoint of scientists. I would like to ask my predecessor, Dr. Bronk, if he would care to say a few words on this matter to us. We always treasure his wisdom and experience.

DR. BRONK: On an occasion such as this, I am frequently reminded of the captain of a whaling ship out of New Bedford, who, because he was part owner of the vessel, was part of the after-cargo, and he was succeeded by a new captain. He said to the new skipper, "If there is anything you want from me, why, of course, I will be glad to give it to you," and the new captain said, "What I want from you is silence and damned little of that."

Dr. Seitz has asked me and, while I have no questions to ask, because your guests this morning are old friends of mine and I know of their devotion to our interests, I would like to take this opportunity to say a few words of appreciation for what the Congress has done.

Because this is the 101st year of the history of this organization, it is appropriate to recall that, 102 or 103 years ago, the Congress passed the Morrill Act. It was the Morrill Act which made possible the support of our land-grant universities. The frontiers of our country had been explored, and it became obvious that it was necessary to have more young men and women trained beyond the level of high school education in order to develop our new frontiers. So the Morrill Act provided Federal funds for the development of institutions for the training of young men and women for industry and agriculture, especially, based on basic research.

Now, because of the development of those men and women, we have reached a new era in our country, and it is again important to recognize that we need new facilities for the development of the unexplored frontiers of knowledge for the furtherance of our national security and national welfare.

So, as I have over the last 20 years been privileged to associate with our friends of Congress, I have been deeply impressed by the fact that they have recognized that education and research are inextricably woven together. They recognize that by supporting basic research they are also supporting education—education of young men and women for an unanticipated future.

Whatever may be the opportunities and the dangers of the future, we are going to need trained men and women, trained not only in the natural sciences, as we have just now heard eloquently expressed, but trained also in the social sciences, which determine the influence of the natural sciences and what the natural sciences can do for the furtherance of human welfare. So each year, when Dr. Waterman—and now Dr. Haworth—and I have appeared for the National Science Foundation budget, we have been encouraged to find that there is an appreciation of this close relationship of basic research to the furtherance of higher education.

I am also impressed by the fact that Congress has been aware of the fact that research is not something separate and apart from our general national activities. They have been aware of the fact that much of the money which is provided for research goes back into the national economy, so that it is not providing money for something which is independent of the rest of our national activity.

Also, I am impressed by the fact that they have been eager to learn. I recall a good many years ago that Mr. Priest, who is no longer with us, was confronted by difficult decisions—he and his committee—regarding the polio vaccine and certain legislative

matters concerned therewith. He came to us and asked that we organize a symposium to be held in the Halls of Congress, to be attended by 14 eminent medical scientists and the members of his committee. To have sat through those two days, and to have seen this interplay between our legislators and our scientists, was a heartening experience to one who has faith in the future of our democracy.

So, I would say I am not one of those who has any fear for the future of science and its Federal support. I have seen in the history of our country over these 100 years that there has been this awareness that science contributes to our national welfare and security. It is a part of the vitality of our country. So long as we, the scientists, make a reasonable effort to interpret the glossary of terms which are not always easily understood, and, far more important, as long as we interpret our ideals and our hopes and our aspirations and our devotion to our country, we will have the warm support of our colleagues here.

DR. SEITZ: Thank you, Dr. Bronk.

QUESTION: Last year, in the current session of Congress, the Senate passed the McClellan Bill to establish a commission to study the reorganization of science in the Government. I would like to ask Representative Miller what he thinks about that, whether he regards it as necessary or desirable.

MR. MILLER: I think that we have met the necessity for that with the Elliott Committee. I think we have a lot of work to do before we start putting into law some of the suggestions that have been made. I am not too confident that this approach is the best one, although, frankly, I am not too familiar with it. A number of similar pieces of legislation have been proposed, but I don't think the time is quite here to have to harden our thinking to the point where we pass fiat legislation.

DR. SEITZ: Are there any other comments on that? Is there another question? Dr. Sawyer?

DR. SAWYER: A number of people have pointed out that some 20 universities receive two thirds of all of the money for research and development. I suppose that, to an extent, this is a reflection of the competence of these universities. I wonder if Congress feels it should do something that would develop the competence in other

universities, or something that would distribute the research money among a larger number of universities?

MR. MILLER: I think that this is one of the things that has concerned many of us in the Committee on Science and Astronautics, because, after all, we do exercise control over the National Science Foundation, and naturally we have control over the monies that go out from NASA.

I would like to see the competence of universities throughout the country raised to the standard of the 20 of which you speak. I do not think this is impossible. In the meantime, the question has come up, "Why don't you put some money into those places?" In the first place, are you going to penalize competence? Are you going to say that, because this university has reached a high degree of competence, we are going to put it on the shelf until we help institutions that have not reached that degree of competence or efficiency? I think more money is going into other universities. I think there are universities that are making a supreme effort to raise their standards—to gain knowledge—and that should be so.

Naturally, as a Californian, I am very proud of our institutions on the West Coast, but I don't think the Government should penalize them because they are good any more than they should penalize contractors on the West Coast because they have shown a degree of competence. We welcome the effort that can be made in other places and the challenge that these other institutions should offer to raise the general standard of excellence throughout the country. It would be healthy for the universities and the institutions that are now on top to be given a challenge of this kind.

MR. DADDARIO: Dean Sawyer, as I had earlier remarked this is one of the problems we are touching on. It is raised time and time again by members of Congress who come from states where the level of support is not as high as it is in others. It does appear that we have to come to some understanding as to whether we start off with quality, and it has been suggested by many that it is up to the universities and some of the states themselves to build up an inner competence, so that there can be a level of quality in certain fields.

Somewhere along the line, adjustments are taking place. The fact that the Manned Space Center is in Houston, for example, has attracted a great deal of activity in the academic field in that area. Rice University and its trustees, for example, recognizing

that they needed to attract professors of higher quality, brought a suit so that it might lower the bar against segregation which had been built into it by the original donor.

This bar has now been lowered, but I bring this up only because it shows that there is movement, that quality is being built up, that adjustments are taking place, and yet we have not established a formula through which we could spread the funds around so that we could, in balance, raise standards everywhere.

MR. COHELAN: I would like to comment on that. This subject is very dear to my heart. Our own domestic "brain drain"—this is about what it amounts to. First I want to echo what Congressman Miller said. It is not only a hometown phenomenon, but we are both products of California. Although almost a generation separates us in years, I think it is very interesting to see the influence that our state educational system had on both of us. We are both products of its schools. I personally am very proud in reflection about what has been done by the citizens of our state. We are very proud of our educational system. As you know, we have a tremendous state university system. We have a system of junior colleges—I think we have 63—and we have pioneered in this field.

This goes back to the question of the supply of manpower in this field, and, if we use Conant's figures, we have roughly 1,900 so-called schools of higher learning in this country. Of those 1,900, 600 are junior colleges distributed throughout the country. Of the remainder, if you compare the British university with the American university, we have roughly 90 universities of standards somewhat comparable to the British universities.

If this is true (I am citing Conant's book, Education and Liberty; I happen to have studied and worked abroad and I feel he is pretty nearly correct), I think it dramatizes the problem that we have. The "brain drain" will go to the major universities in our country. I think this is pretty much what has happened. While this does not mean—as it does in England where they are having the same problem—that universities that are not in that general ranking, or whatever one wants to call it, cannot do something to attract and hold scientists, it is pretty hard to do this if the universities are going to be competing with the Government quite as extensively as they are now.

You know some of the problems. For example, we have a Hudson Research Institute, and the RAND Corporation and all these other arrangements to permit the Government to pay better salaries

and get people held in these complexes of research and development. That is tough competition.

It would seem to me that somewhere along the line we have to face up to the realities of the marketplace, as it were, in terms of the supply of our existing assets, and try, through some socially useful method, to work it out so that some of these other claims that are properly made can be better distributed.

DR. SEITZ: Dr. Bronk, did you want to comment on that?

DR. BRONK: As Dr. Waterman could say better than I, the National Science Foundation has been very much interested in solving this problem, and it has been our effort through the institutional development programs to create more strong centers of research and graduate education throughout the country. It is in this way that we will be justified in placing more funds in more areas.

Last July, Dr. Killian and I were speaking before the National Governors Conference in Miami Beach. The conference was devoted to the subject of the importance of more centers of university research throughout the nation. One of the governors posed this question, which will interest Dean Sawyer: "Why is it that the University of Michigan receives so much more Federal support for research than does the state university in my state?" To which I replied, "As an alumnus of the University of Michigan, may I say that the University of Michigan made itself strong, and thereby justified the support it is getting."

MR. NAFTALIN: The Elliott Committee has established as one of its studies the very question that Dean Sawyer raised, and we will be interested in reactions from you people on that subject.

DR. SEITZ: Do you want to speak to your own question?

DR. SAWYER: I appreciate very much what the National Science Foundation has done to strengthen some of these other schools. One thing that worries me, however, is that the National Science Foundation, which has done more than any other agency to try to help in a wide variety of schools, got slapped down by Congress last year. I notice that NASA, which has set up a training program to give money for training scientists in space fields to a large number of universities, also seems to have received some criticism from Congress. While I appreciate what you say about your desire to develop strength in other universities, I have some question about the procedures that have been taken in Congress.

DR. BRONK: This exchange was not rehearsed between Ralph and me.

QUESTION: Dr. Seitz, I am worried a little bit about the magnitude of money that goes into research and development through NASA, through NSF, through all of these various things. One apparently has to put up some kind of bed for research. It seems to me the goose that lays the golden egg in science is education. The big schools and the smaller schools have suffered. I wonder if the gentlemen of Congress have considered giving money directly for educational purposes without the research and development string attached to it.

MR. MILLER: I was going to say a minute ago in answer to Dean Sawyer, one of the reasons NASA got slapped down in its field is because someone came in and said, "This is Federal aid to education," and it took a fight to get it back.

I don't know that any of the institutions as now set up by law—NASA, NSF or anybody else—could make these direct grants to education, per se, and not for specific facets or phases of the work that is going to be done.

We are concerned—and I want to reiterate what Mr. Cohelan said—about behavioral sciences and the humanities. I think we tend to upset what seems to be the proper balance in the field of education. I am not an educator; I am not a brain; but this is the thing that appeals to me today.

I am in the process of reading Dr. Clark Kerr's book, The Uses of the Universities, in which he points up some of these things. You see, Dr. Bronk likes to tell me about Dr. Kerr. I think we know this problem, but we can't get money for that purpose through the subterfuge; there has been a resistance to anything in the line of Federal aid to education, though it is one of the things that many of us have fought for.

I have been here for 20 years, and the first year I was here I had the privilege of being the secretary of a bipartisan group. The leaders of this House group to advance Federal aid to education were Jennings Randolph of West Virginia and Everett Dirksen of Illinois. Well, we have not made a lot of progress in 20 years. We are getting close to it as time goes on, but the time should come when the Federal Government, in my estimation, should step into this picture. We found in our educational system in California that we needed equalization, so that the poorer counties could meet the standards of education set down by the Board of Education just as

well as the rich counties, and this has been one of our achievements and successes in this field.

I would like to see this come about but, at the present time, I don't see any possibility of giving direct grants for education per se to universities.

DR. SEITZ: The bill that was passed—$1.2 billion, I think—for matching money for buildings in educational institutions would seem to be something of that nature.

MR. MILLER: It is a step in that direction.

MR. COHELAN: I am sure this needs to be done, and the gentleman who raised the question and everybody should know that the three gentlemen who are sitting before you are very strong exponents of this program—that is to say, some kind of effective measure of aid at the Federal level without strings.

The only thing I want to say is that I am not sure whether, if we arrive at the point where we get this maximum effort, it is going to yield the result that is intended. In other words, I think we really ought to take a look at just what we can expect to get. Again I must rely on some of my reading and education. It is quite remarkable, I believe—considering the qualitative differences between European systems, with the gymnasiums and with the haute culture, and the British public school, and the British universities of Oxford, and red bricks and all that—to reflect upon the qualitative differences between our system and their system. Again I am relying on Professor Conant. He likens their system unto a tube and ours unto a funnel. We funnel our people in, but when we get down to the point of graduate study, it is a common one per cent across the board. The point he is making of course, is that we are not losing our intellectual capital, but that, when you get down at the other end of the scale in this country, there are from 35 million to 50 million impoverished people. It is an awful lot of people, and they are living in the culture of poverty and they need help. They don't need help that is going to make them all scientists. They need help in learning how to read and write so that they can function more effectively in a society that is moving away from them.

This is a dimension of the problem which, I suggest, needs massive attention. I am very happy to say that President Johnson, with his antipoverty program, is focusing in that area. There is no question but that there will be some fallout. But, as a practical

matter, I wonder what per cent of the total it is going to be. I think we are going to upgrade a lot of people, but I am not sure it is going to yield quite the result that we think it might.

QUESTION: Realizing that the public is divided in much of its support for science, I would be very much interested in your reaction to the effort of the professional societies to keep the public informed in lay language of what is happening in science. Is it accomplishing anything and does it help your job in any way to get the problems of science across?

MR. MILLER: I think that it does and I would encourage more of it. The trouble is that there are too many of us who don't know what that word "cryogenic" at the beginning means.

MR. COHELAN: As one who does not know what it means, let me tell you what I think the problem is. We politicians and ordinary teachers and poets and writers, and what-not, are the ones who have to discover the reality of science. The reality with which the physical scientists deal is a mathematical abstraction. It can be described in many ways. Many of us are of the generation of Newtonian physics. Now we have moved into another revolution which spells out another kind of reality in abstract mathematical terms. But I am a great student of methodology and I have had the privilege of looking into Northrop's book at some length—The Logic of the Sciences and the Humanities. He points out and uses this fancy nomenclature—"epistemic correlations"—to describe the requirement we have in the social sciences and the arts.

I suggest to you that the politician should be included in the group that needs education. Unless we really know the reality with which we are dealing, we have to think of other ways of expressing it so that it becomes reality to other people as well.

MR. DADDARIO: I would like to add one thing to that. I think there is a better understanding; whether it comes from the work the professional societies are doing, I don't know. But I find a level of support in my own district and in other places which would indicate that there is knowledge and understanding. Thus, I believe that we will make a success out of this cooperative effort that we are engaged in at the moment. I do think that we can rally support so that the research program will, in the future, not suffer.

DR. SEITZ: We have the good fortune to have Sir Gordon Sutherland, Director of the National Physical Laboratory, with us this morning.

He is an honorary American, having lived here for 10 years. Would you care to make any comment to us, Sir Gordon? I don't want to put any pressure on you. I realize you may feel hesitant, but we would be glad to hear from you.

SIR GORDON: First, I would like to thank you for allowing me to listen in this morning. The problem of science in Government is one which is exercising all countries at present. I was particularly interested to come and listen to your problems. They bear a striking resemblance to some of ours. I see that you do not have a very logical way of dealing with things, and neither do we.

I was very interested indeed to see that there is no question of party politics coming into science here. This has become, I am afraid, a bit of a party issue in Britain at present, and I think it very unfortunate.

You are particularly fortunate that both parties are determined to see the United States very strong scientifically, and that you are really trying to see how you can best manage this.

This problem, of course, of setting the apportionment of funds among the different areas of science is, I think, still insoluble, because the people who can best judge the value of any particular field of research are those who are actively engaged in it, and if they are actively engaged in it, they are, of course, partisan supporters of their own particular field. It is very, very difficult indeed to find people who are sufficiently detached and yet have enough technical knowledge to make the relative assessment.

I was especially interested in the question raised by Dean Sawyer—now that the Government is putting a lot of money into science, will it also take this opportunity to exercise some influence over the distribution of scientific effort within the country? This problem has also arisen in Britain, in exactly the same way. The tremendous concentration of scientific talent in Oxford and Cambridge has led to similar problems with us, too, and recently, as a matter of fact, a decision has been taken to put a large magnetic laboratory in the Newcastle-Durham area and not near Oxford, which, in fact, would have been the best place scientifically.

I was present at the meeting at which this decision was taken, and the scientists in Oxford, while they regretted it, did see the point of this decision: that, if you go on making Oxford and Cambridge stronger and stronger, you will never be able to get any real distribution at all.

If one will, occasionally, put a new facility in an area which is not quite as advanced, the important thing is to have a good leader. You really back men and not places, and, I think, if you can arrange the distribution of funds, it becomes more even by backing the extremely able men in small places. This would be the way to do it.

Finally, I would like to comment on this question of Federal aid to education, which puzzled me when I was here and it still puzzles me, because I don't know what the arguments are against it, really. Perhaps some of the Congressmen would tell me. Obviously all of the Congressmen here are—shall we say, within these four walls—in favor of it.

It does seem to me this is absolutely essential. I don't know how a great country like this can in fact achieve its goals in education without realizing this, and having visited Russia and China and seen what they are doing there, I really think that the leaders there would feel this is their greatest secret weapon—this, which seems to me just a prejudice against Federal aid to education.

I think inevitably you will come around to it. You simply have to. I hope I have not been too outspoken. Thank you very much for giving me the opportunity to talk.

DR. SEITZ: I wonder if there are any comments or questions that you would like to put to Sir Gordon?

MR. DADDARIO: I don't want to bolster any of the arguments against the proposition.

DR. SEITZ: Are there any other questions or comments? Sir Gordon's comments remind me very much of a situation I appreciated last year in spending about 10 days at the European Atomic Research Center in Mol in Belgium, established initially by the Belgians themselves and then taken over as part of EURATOM complex.

This laboratory is about an hour's drive on a fast highway from Antwerp in what is a relatively depressed area of Belgium. It was put there because it was a depressed area. The Government wanted to bring into East Flanders something of an essentially intellectual nature, not merely to create employment, but to provide a stimulus to an area that had known nothing new, so to speak, for a substantial period of time. This laboratory, plus the establishment of a major division of their Bureau of Standards in East Flanders, is doing a great deal to provide that essential vitamin.

I remember, too, that Morrill once was called in by the State of Iowa for advice on what to do to stimulate the state, and he said, "What you need is a good bank robbery to get everyone excited." I think the Belgians took a somewhat different, less Scandinavian, view about what East Flanders needed.

QUESTION: Sir Gordon raised a point the other evening, on which I would like to have a little information if it is available. We frequently hear a comparison between the total number of university students in this country and in Russia, but it seems to me that we neglect, or—at least so far as I have seen any figures—neglect the large mass of students who must be in training in our friendly nations—Western Europe for example, perhaps Japan.

Does anyone know how that compares with our four million and the Russians' millions? I don't remember the figure cited for that.

DR. SEITZ: Is anyone here familiar with the figures for Japan?

QUESTION: Total Western Europe, I would think, would be most important.

DR. SEITZ: As I recall from my period with NATO, up to the average age of 18, the percentage figures are quite comparable, with more specialization starting in Europe usually somewhat earlier, at age 14. I am saying that is true for the continent of Europe. I think that is less true in the United Kingdom, where there is more of a tendency to cut off education at age 14 or 15. That has been one of the national problems. At age 18, a much smaller fraction go on to the universities than in the United States.

I would guess Japan would resemble Europe somewhat, but the post-war trends in Japan have been as nearly as possible to take over the American framework because of the influence of the post-war period. I think that is the essence of it.

QUESTION: The question of a wider distribution of strong centers of education has been discussed largely in terms of the extremes. Are you going to give support only to those places which are already very strong, or are you going to start large new installations in depressed areas?

I would like to testify to the success which the National Science Foundation has achieved over the last 10 or 15 years in upgrading

almost every institution in the United States, by the general notion that grants for research are available to anyone with a good idea.

Before World War II, it was very difficult to interest some of our best graduate students, just entering on their scientific careers, in teaching at a great number of institutions, because they were afraid that if they went there they would not receive sufficient support to enable them to do research. The National Science Foundation has brought about a great deal more interest on the part of good young scientists in teaching at a great variety of institutions, and it is already possible to see the yield of this in terms of well-prepared students coming from these places, which now have stronger and livelier faculties than they had before.

This is an example perhaps of the intangible or unforeseeable relation between research supported by small grants in a diverse way and in a rather grassroots sort of way, and the strength of education.

DR. SEITZ: Thank you, Dr. Bartlett.

(Whereupon, at 12:00 noon, the session was adjourned.)