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CAMBRIDGE CITY COUNCIL HEARING

JUNE 23, 1976

CITY OF CAMBRIDGE

BEFORE:

CAMBRIDGE CITY COUNCIL

HEARING ON RECOMBINANT DNA EXPERIMENTATION

Presiding: MAYOR ALFRED VELLUCCI

Wednesday, June 23, 1976
City Hall
Cambridge, Massachusetts

(June Gibbs, Gail Farrish, Stenographers)

(Corrected by Oral History Project, 1978)

[The Pledge of Allegiance]

Mayor Vellucci: Ladies and gentlemen. There are students of the Cambridge High School, the Cambridge Public High School, that have a song they would like to sing.

[This Land is Your Land]

Mayor Vellucci: I would like to thank the students for their wonderful and beautiful and sincere presentation.

I would like to announce the order of events for this public hearing held on this June twenty-third, 1976. The sole purpose of this hearing is for the City Council and the people of Cambridge to hear testimony concerning a possible construction of a special containment laboratory at Harvard College which is intended to eventually be used for experimentation in genetic recombinance. No decision will be made at tonight's meeting; this is a public hearing, the purpose of which is solely to gather information. The Council will decide at a later date, and at a regular Council meeting, what action, if any, it wishes to pursue in this matter. It is in the interest of all concerned if we recognize and adhere to the following agenda: One, presentation by the University delegation (30 minutes maximum); two, questions from members of the Council only; three, questions of fact only from members of the Council and from the public upon recognition by the Chair. (Neither arguments nor opinions

are in order at this time; this period is to settle questions of fact only.) Four, arguments by the public, upon recognition by the Chair, in favor of the University's position (ten minutes for each speaker.) Five, arguments by the public, upon recognition by the Chair, in opposition to the University's position. (Ten minutes maximum for each speaker.)

It is helpful if all speakers are as frank, succinct, and brief as possible in their remarks, given a ten-minute time limit. The subject matter before the Council tonight is important to all of us. No one person or group has a monopoly on the interests at stake. Whether this research takes place here or elsewhere, whether it produces good or evil, all of us stand to be affected by the outcome. As such, the debate must take place in the public forum, with you, the public, taking a major role. I thank you for your interest and cooperation.

I assume those that are sitting there at the table are the delegation representing Harvard College. Is that right?

A Witness: That is correct.

Mayor Vellucci: Okay, sir. Then, for the person who is speaking, kindly give your name, your address, your title and the organization that you represent. Refrain from using the alphabet. Most of us in this room, including myself, are lay people. We don't understand your alphabet, so you will spell it out

for us so we will know exactly what you are talking about because we are here to listen. Thank you.

Leahy: Mr. Mayor, Councilors. My name is Richard Leahy. I live at 517 Hammond Street, Newton, Massachusetts. I am the Associate Dean of the faculty of Harvard University; I am a vice chairman of the Committee in Research Policy of that faculty, and I have special responsibility in that faculty for the administration that sponsored the search, including federally-sponsored research activity. Since my background is in the sciences, I am not able to make a statement at this time because I have as much difficulty in dealing with the alphabet as you do, perhaps.

I do, however, want to introduce some people from Harvard and some guests, and introduce some associates from Harvard and a guest from the NIH who are gathered here with the intention of representing a spectrum of expert and specific knowledge in an attempt to permit us to answer in the most direct fashion possible to questions raised by the Council or brought out, or maybe brought out in subsequent discussions raised this evening.

Two of the Harvard faculty members will also present comments in the Harvard half hour on various elements of the issues raised when the Mayor called for a public hearing.

Hopefully, these remarks will also respond to some specific issues raised generally in connection with Harvard's proposal to build a small teaching-type laboratory in Cambridge.

These comments will be offered by NIH representatives who are here this evening and will certainly provide a focus for further discussion. I would also like to mention, however, that in considering the proposal to build a laboratory of this type within Harvard hopes the committee under such policy and Dean Rosovsky's public statement specifically refers that more implications considering the undertaking of research in areas having such a potential direct impact on human affairs.

Both statements commit the University to continuing with its review of this matter and we will welcome a broad participation in these deliberations.

We also will actively participate in its continuing studies which the City may wish to sponsor.

Speaking from Harvard this evening we have Professor Mark Ptashne, who is at my right, who is Professor of Biochemistry and Molecular Biology with the Faculty of Arts and Sciences, and who is also the principal investigator on the initial proposal to the National Cancer Institute requesting funding for this continuing facility.

In the corner behind Councilor Sullivan, I would like to introduce Dr. Maxine Singer, who is a research scientist with the National

Institutes of Health, who I understand is here as a direct request of that agency in the federal government. Also here from the National Institutes of Health, Doctor Emmett Barkley, who is the Director of the Office of Research Safety for the National Institutes of Health, an expert on the type of laboratory facility and the operation of such a facility that we have proposed to construct. With the Mayor's permission, I suggest that we go directly to Professor Ptashne's statement at this point.

Mayor Vellucci: Go ahead, give us your name, your address and your title, who you represent.

Ptashne: Mark Ptashne, I live at 376 Harvard Street in Cambridge. I am Professor of Biochemistry and Molecular Biology at Harvard and I represent our department and, thereby, the University by what I say.

There are several points which I wish to touch on in a few moments, each one of these requires much greater discussion than I have time for and so I hope that in the discussion period you will raise issues that are not clear from what I have to say.

I have taken the liberty of outlining my remarks and I hope you have a copy of it to make it, hopefully, somewhat easier to follow what I have to say.

I want to start with a consideration, as I understand it, as to

what has precipitated this meeting. The meeting has been called because Harvard University has proposed to renovate three rooms in its biological laboratories for use as a so-called P3 facility. This has given rise to two misapprehensions. The first is that the decision to construct this facility means that an entirely new class of research will begin. That view is seriously misleading. The second misapprehension is that the research associated with that laboratory constitutes some serious risk to the health of the citizens of Cambridge. That view, I think, is totally false.

I must begin with a brief mention of just what is a P3 facility, if you will bear with me. Laboratories are designated by federal guidelines as P, which stands for physical, P1, P2, P3 or P4, depending on how strictly their construction isolates them from the outside world. P1 designates an ordinary laboratory, not isolated in any way from the outside world, whereas P4 designates a very highly-contained laboratory. The kind of facility we are proposing to construct, P3, is a moderate containment laboratory. There exists, literally, according to the National Cancer Institute, hundreds, hundreds of these P3 facilities in universities and hospitals throughout the country, including at MIT and Harvard Medical School. Briefly, these laboratories are designed first of all to provide especially clean environments inside the lab and, also, to greatly reduce exposure of the outside world to organisms that are present inside the lab. It

is important to understand that because these laboratories are not designed, are not designed to prevent the occasional escape of organisms, they are not intended for use with virulent pathogens, that is, disease-causing agents. These laboratories, nevertheless, will prevent the escape of substantial quantities of microorganisms which are ordinarily required for known pathogens to initiate infection; moreover, as I shall describe and as shall be described probably by others, federal and Harvard regulations strictly forbid the use of this laboratory--in fact any laboratory in the college--of any organisms known to pose a serious pathogenic threat to man. And, finally, as we shall see, experiments are not permitted which are even judged likely to give rise to such pathogens. It is important to understand, then, that there are at this level of discussion already two features of safety.

The first is physical containment as a backup to the basic policy of prohibition against any material known to be a serious pathogen or any material judged likely to form such a pathogen.

There is an additional safety feature called biological containment, which we will discuss in a moment.

There are strict federal guidelines governing the construction of P3 laboratories. Doctor Emmett Barkley, the Director of the Office of Research Safety at the National Cancer Institute, will explain to

you, if you wish, that the safety features of the proposed Harvard facility greatly exceed the federal requirements. Should you wish, Dr. Barkley will also explain in detail how P3 laboratories work, what they are designed to do, what degree of isolation they provide.

Now, why are we building this laboratory? Our immediate need for this laboratory is to provide facilities for the growth of animal cells and viruses. This kind of work with animal cells and viruses is performed at a large number of research laboratories and hospitals in the area and throughout the country under much less restrictive conditions as are, in fact, permitted by federal guidelines. I hope it does not escape your attention that at Harvard College we have proceeded with extraordinary, probably unprecedented caution in dealing with such matters.

In fact, the safeguards we propose for our work with animal cells and viruses we believe go beyond those of any facility anywhere in the country with which we are familiar. One part of one of the three laboratories we will construct will, under special conditions that I and Dr. Branton will describe, be used for so-called recombinant DNA experiments.

Now we must consider briefly what a recombinant DNA experiment is. A typical experiment might begin with a bacteria E. coli K12. Literally thousands of person years have been devoted to studying

E. coli K12 and it is probably the best understood organism in the world. Some relatives of this bacteria, that is, other strains of this bacteria E. coli, are found in rather large numbers in normal intestinal tracts, but E. coli K12, that particular strain we are talking about, does not itself ordinarily inhabit the human intestinal tract.

E. coli, like all living organisms, carry genes that code for fundamental life processes on molecules called DNA. That's the only abbreviation I'll use. Some E. coli bacteria carry an extra DNA molecule, a small molecule called a plasmid. I hope that's the last technical term I'll use. This can be removed from the bacteria and a small piece of DNA from some other organism inserted into it. The combined old and new DNA, a hybrid DNA molecule, may be reinstated into the bacteria. The hybrid DNA then divides as the bacteria divides and is contained within the bacteria. It is highly misleading to refer to these bacteria containing plasmids with bits of foreign DNA as altogether new organisms. Now, why would one want to do such an experiment?

Obviously, this is a question that would require a much longer discussion, but let me touch on a few basic points.

Most molecular biologists, not all, but most, expect that the information being derived from these experiments that are now ongoing

will profoundly advance our understanding of life processes. For the first time, we believe we are able to isolate genes from higher organisms and learn how they are arranged. May I say that we know at this moment virtually nothing about how DNA, about how genes in higher organisms are arranged, or how they function? We have great information on such subjects but virtually no information on such subjects for say, people, or other higher organisms. We hope to learn how genes function in higher organisms and how that function goes awry in diseases such as cancer.

We believe, and I think most molecular biologists believe, that experiments of this sort provide us with a powerful tool for learning about the natural world. Matthew Meselson, Professor and Chairman of the Department of Biochemistry and Molecular Biology at Harvard, will speak further to this issue if you wish.

Now, how are these experiments regulated? Following two years of the liberation and widely-publicized debate, the National Institutes of Health has released federal guidelines that strictly regulate the recombinant DNA experiments.

According to Dr. Donald Frederickson, the Director of the National Institutes of Health, "the object of the guidelines is to insure that experimental DNA recombination will have no ill effects on those engaged in the work, on the general public, or on the environment."

Dr. Maxine Singer, as Dr. Leahy indicated, who is head of the section on nucleic acid enzymology at the National Cancer Institute, has been active in the creation of these guidelines, and she is here tonight. She will describe to you the history of the formulation of the guidelines, what they say, and how they will be implemented.

There is nothing unusual per se in the existence of these guidelines. Similar guidelines cover the use of radioisotopes, animals, certain chemicals, and so on, that are used in biological and chemical research. The very important point I wish to stress, Mr. Mayor, is that I hope I can make clear--and if not, I urge you to ask me to clarify it in a discussion session--the important point I wish to make clear is [that] a DNA experiment is not limited.

Mr. Mayor, this is such an important point I would like to explain it. I wish to stress to you to attempt to clarify what I am able. There is some misunderstanding in this; unless this fundamental misunderstanding is clarified there can be no intelligent discussion of this subject.

Recombinant DNA experiments as a class are not limited to P3 facilities. Many such experiments, according to the federal guidelines, are allowed in ordinary laboratories with no containment whatsoever, P1. Many other such experiments are allowed in laboratories with moderate, very slight degrees of containment, so-called P2 facilities. And many such experiments are now being conducted by Harvard and MIT, and, in

fact, at virtually every major university and research hospital throughout the world.

As Dr. Singer will explain, if you wish, only a certain rather narrow class of experiments will go on in the P3 facility. The point I wish to reiterate is that if the critics wish to address the question of recombinant DNA research, it must be clarified whether they are objecting, if they are objecting to the experiments, or [to] the way the experiments are done in P1 facilities, P2-type facilities, or P3-type facilities, or whatever. But not constructing the facility does not mean the recombinant DNA experiments will not go on, as they go on at every major university. If I have not made that clear, I hope you will ask me to clarify that later.

Mayor Vellucci: All right. Are you finished?

Ptashne: No.

Mayor Vellucci: Keep on, carry on.

Ptashne: At Harvard College, whatever recombinant DNA work is contemplated, whether it requires P2 or P3 or P1, that work must be explicitly approved by the University Safety Committee, the so-called Committee on the Regulation of Hazardous Biological Agents. This committee has been hard at work for over a year. The Commissioner of Public Health in Cambridge has been invited to attend meetings of the Safety Committee.

His representative attended the meeting of May 24, 1976, and that representative may attend and contribute to all future meetings. The head of the committee, Dr. Branton, Professor of Biology at Harvard, will explain to you how that committee works.

Mayor Vellucci: Did I understand you to say, the Commissioner of Public Health in Cambridge?

Ptashne: Yes. He was invited to attend the meeting of the Safety Committee.

Mayor Vellucci: Who was this Commissioner you invited?

Ptashne: Mr. Mayor, who was the person who attended this meeting?

Branton: I invited Dr. Leslie MacLeod, who I understand was the Acting Commissioner of Public Health. He in turn sent his representative to the last meeting of the Safety Commission.

Mayor Vellucci: Who was that?

Branton: Dr. Bouchler. I am not sure if I am pronouncing the name correctly.

Mayor Vellucci: Dr. Bouchler? Never heard of him. He is not the Health Commissioner; he is not a doctor.

Russell: There has been a vacancy for the Commissioner of Public

Health for some time. That is why we are wondering how you could have had--

Mayor Vellucci: We don't have a Health Commissioner. We haven't had one for over a year.

Branton: I am aware you don't have a Health Commissioner. I was given to understand--and I did go to a considerable amount of work to try to discover who the Commissioner of Public Health was--

Mayor Vellucci: You never contacted me, did you?

Branton: No, I did not contact you.

Mayor Vellucci: Very well, carry on. We'll get to that later.

Russell: Mr. Mayor, may I ask a question?

Mayor Vellucci: Go ahead, Mr. Russell.

Russell: I think it is highly an insult to the Mayor of Cambridge or the City Manager to have such a tedious situation we are in and that we had this meeting going on and a person of the Health Department or the City of Cambridge hospital attended these meetings and no report was given back to the Mayor's Office or the Manager's Office. I think this is a disgrace and I think the high magnitude of this hearing has come about--I think we are all in awe of what is happening.

Mayor Vellucci: Councilor, I think that as we go along--the agenda is set up; I think we'll continue on. We'll get back to the question before you leave.

Ptashne: Mr. Mayor, what risk is associated with the experiments--can I be heard?

Mayor Vellucci: Certainly.

Ptashne: Let me begin by giving you a blanket statement of fact. No known dangerous organism has ever been produced by recombinant DNA experiment. For what it's worth, during the past two years millions of bacterial cells carrying pieces of foreign DNA from other bacteria, from yeast and fruit flies, in other words, typical recombinant DNA experiments, have been constructed in many laboratories in this country.

So far as we know, none of these cells containing foreign DNA has proved itself hazardous. Similar research with recombinant DNA has been going on over the past two years all over the world.

We must realize that unlike other real risks involved in experimentation the risks in this case are purely hypothetical. Not only has no known dangerous organism every been produced, but I believe it to be the opinion of the overwhelming majority of microbiologists that there is, in fact, no significant risk involved in experiments

authorized to be done by the federal guidelines in P1, P2 or P3 laboratories.

Let me try to explain the scientific reasoning behind that estimation. As I explained previously, E. coli K12 is itself the strain that we use bacterium is not the human pathogen. A vast array of microbiological studies spanning over fifty years has taught us that creation of the pathogenic bacterium requires the simultaneous presence of a large number of factors not present in our laboratory strains.

It is extraordinarily unlikely that the addition of a small piece of foreign DNA could impart to these strains the ability to survive in intestinal tracts, cause disease, and be transmissible to other animals, humans or plants.

Moreover, as Dr. Singer will explain, many of these recombinant DNA experiments must begin according to federal guidelines with strains that are vastly less viable, vastly less able to survive outside the laboratory than even our E. coli K12 strain. This use of the highly enfeebled bacteria provides an additional safety feature which I referred to before as biological containment.

We believe, Mr. Mayor, and I believe that the majority of informed opinion would agree that the probability that such strains could survive or transfer plasmids to other bacteria is so small that we do

not believe that a plausible scenario could be described wherein a serious hazard could result from such a recombinant DNA experiment performed in a P1, a P2 or a P3 laboratory.

Nevertheless we cannot say that there is absolutely no risk involved in these experiments. But then, Mr. Mayor, I ask you to consider that statement, little risk, can be made about few human activities. It certainly cannot be made for many of the experiments performed every day in biological and chemical laboratories.

The degree of risk involved in carefully regulated recombinant DNA experiments is almost virtually, in my estimation, less than that in maintaining a household pet. I can expand on that if you wish, and it is certainly less involved than maintaining a room of mice, rats, hamsters, monkeys and certain other animals, all of which are known to be carriers of serious human pathogens.

Mr. Mayor, I submit to you that if we were to stop these carefully regulated experiments on the basis of their hypothetical risk we would also certainly have to cease many standard biological experiments--certainly most experiments involving animal viruses, including tumor viruses, animal cells, carcinogens and mutagens.

In a word, this course would signal the end of biomedical research. I believe, instead, we should regard the development of the federal guidelines governing recombinant DNA research and the willingness

of scientists to restrict their work according to those guidelines as progressive events showing an extraordinary concern for general safety and welfare.

Mayor Vellucci: Thank you. Do I understand that you have here Dr. Singer from the National Institutes of Health?

Ptashne: Yes. We thought that Dr. Branton might say a word and then--if that's all right with you, Mr. Mayor--then Dr. Singer would like to say a word.

Mayor Vellucci: All right. Will the gentleman please give his name, his address, his title and the organization that he represents.

Branton: I'm Daniel Branton. I live at 14 Elliot Road in Lexington, Massachusetts. I'm a Professor of Biology at Harvard University, and I'm here as Chairman of the Committee on the Regulation of Hazardous Biological Agents in the Faculty of Arts and Science at Harvard University.

Although as a group we are mostly scientists, our primary concern, Mr. Mayor, Members of the Council, is really the same as yours: that nothing be done at Harvard University that could possibly endanger public health.

This is a responsibility that I can assure you rests just as heavily on our shoulders as does your greater responsibility as Mayor and

Councilors to the City of Cambridge.

Work to set up this Committee was started in July 1975, well before current NIH guidelines to regulate recombinant DNA were formulated and before architects began planning biolabs containment facilities. I'd like to tell you something about what my Committee does.

Basically, we've been asked to recommend guidelines and regulate procedures to be used in handling potentially hazardous agents at Harvard University; to review all research which will involve potentially hazardous biological agents and all research regarding recombinant DNA; and to review design for construction and operation in specialized facilities such as the facility that is now proposed to be built at Harvard University intended for work with potentially hazardous biological agents.

Further, we have to inspect these facilities and assure ourselves that the facilities themselves as well as the procedures for the use of these facilities are safe.

I think it's worth emphasizing several points about the Safety Committee and its function. The Committee is composed of scientists because we're responsible for making difficult, technical judgments about safety and assessment of hazards. However, most of the members of the Committee do not use recombinant DNA techniques and, like myself, if we have a personal stake, it's in assuring that the building

we work in is safe.

Second, the membership of the Committee includes individuals selected so as to provide a diversity of disciplines relevant to the kinds of work that is going to be done--relavent, for example, to recombinant DNA technology; to biological safety and engineering.

The membership includes professional epidemiologists, microbiologists and, what I was given to understand, the Acting Commissioner of Public Health for Cambridge, Dr. Leslie MacLeod has been invited to attend our meetings.

If I erred in understanding that he was the Acting Commissioner, I can only say, Mr. Mayor, that we did our best. My secretary and I spent an entire week trying to discover who the Commissioner of Public Health for Cambridge was.

Mayor Vellucci: One point.

Dr. Branton: Yes.

Mayor Vellucci: Trowbridge 6-6800. The City Manager or the Mayor would have given you all the service you wanted and all the answers, but you didn't do that.

Dr. Branton: My secretary did call the City Manager, and Dr. Leslie Macleod's name was the one given us.

Mayor Vellucci: By the City Manager?

Dr. Branton: That's correct; by his office.

Mayor Vellucci: Carry on.

Dr. Branton: As I indicated, he sent a representative to our last meeting, and I hope that he--or whoever the Commissioner of Public Health is--will continue to contribute to our deliberations as we consider plans for the biolab facilities or any other matters before us.

Government guidelines serve to establish the minimum requirements, but in many cases our requirements--that is to say, the requirements of my Committee--are considerably more stringent. In particular, we set our regulations so as to take into account local building and use conditions which may impose requirements that extend beyond those of the federal regulations.

For example, no one in the federal government is going to tell us that ants are walking around the biolabs or that the building is subject to floods. We have to know these things and we have to make certain that such factors are taken into account in planning the facilities and projecting operating procedures.

As scientists, we are aware [that] the work with recombinant DNA has the potential of making possibly enormous strides in our ability to

understand fundamental life processes and so to control diseases about which we now understand very little. However, our awareness of these tremendous potentials does not relieve us of the responsibility to exercise the utmost caution in regulating work with recombinant DNA. It is a clearly understood policy in Harvard that we have absolutely no intention of allowing work with organisms or with recombinant DNA that is known or [is] likely to generate a threat to human life or health of man.

What we have been asked to do and what we are doing, I think, and I sincerely hope, with great caution, is to regulate research that does not pose any known threat to public health and which is extremely unlikely ever to pose such a threat.

Finally, let me add that should the Mayor and City Council decide to establish an independent review to insure public safety in Cambridge in matters of recombinant DNA, please be assured that my Committee is ready to cooperate in any way we can.

Thank you.

Mayor Vellucci: Please tell us your name, address and the organization you represent.

Singer: My name is Maxine Singer. I live at 5410 39th Street, N.W., Washington, D. C. I am a biochemist on the staff of the National Cancer

Institute, which is one of the institutes of the National Institutes of Health.

Dr. Emmett Barkley and I have come this evening at the request of the Director of NIH to provide information that may be of help to you, sir, and to the City Council, in your consideration of this important matter.

Mayor Vellucci: You represent the [National] Institutes of Health?

Singer: That is correct.

Mayor Vellucci: How did you get on the Harvard team?

Singer: I am not on the Harvard team, sir.

Mayor Vellucci: Then how did you get involved in this particular presentation?

Singer: We were notified that there was a hearing to be held and because the guidelines were only published this morning there was no way to have the information of the guidelines available unless someone came from the Institute to tell you about them.

Mayor Vellucci: So you're here to protect the public's health?

Singer: I'm here to inform you about the nature of the guidelines that have been published.

Mayor Vellucci: You'll have to excuse me, Dr. Singer, but you're not on the agenda here, and there will be a time when we will call you from the agenda. I'm very sorry, but I thought you were here--I was told by these gentlemen to present you, and I was wondering why Harvard would be presenting you.

Singer: Sir, in a sense, I'm here to describe the federal guidelines that have governed the planning of this P3 laboratory.

Mayor Vellucci: I understand that. You are welcome here; please believe me, you're welcome here, but I'm a little confused as to how you got tied in on this, tied into the Harvard presentation being made now.

Ackermann: Mr. Chairman, Mr. Chairman.

Mayor Vellucci: Yes.

Ackermann: I wonder if it wouldn't be wise to listen to the presentation from the NIH at this time, because it is, in a sense, part of the presentation of the facts. I know that in one sense we want to get through with it here, and [in] the other sense, we really want to have everything heard.

Since the Harvard people have finished, it might be well if we have the presentation and--what is your name--?

Singer: Dr. Singer.

Ackermann: I'm sorry. Perhaps Dr. Singer could answer some of the questions.

Mayor Vellucci: Councilor Ackermann, I am going to cooperate with everybody. In this room there is a man sitting back there that has been putting his hand up a dozen times--show your hand. I have been waiting for the time when he will be making his presentation. I thought this representative here was part of this team from Harvard.

Ptashne: Sir, my remarks were entirely formulated with Dr. Singer and Dr. Barkley coming; it is an integral part of the presentation that the complete facts of the guidelines are put before this council now, before the question period comes. It will, in the long run, save us a great deal of time.

Mayor Vellucci: Okay. I do represent the lay people in the city. Now, you are here to represent who: Harvard, the City Council, the City Government, the people of Cambridge, the people of the United States of America--who are you here representing?

Singer: I am here--

Mayor Vellucci: On who's behalf?

Singer: I am here on behalf of Harvard University to explain the

federal guidelines which have been used to design this facility.

Mayor Vellucci: You are part of the team. You may proceed.

Russell: Mr. Mayor.

Mayor Vellucci: Councilor Russell, yes?

Russell: I received a call last night and I thought the guidelines were only released yesterday. I think that someone on this team, this so-called team, would have had the use available, to put a print out so we would know what she is talking about. You know people come in here, like the fellow who addressed us, he ad-libbed some of the speech before him. It sounded great, and a lot of these people out in the audience know what he is talking about. I don't know what he is talking about; I don't think the public knows.

Mayor Vellucci: There are sharp minds in this audience.

Russell: You know--

Mayor Vellucci: You have to be careful what kind of presentations--there are a lot of notes being taken out there.

Russell: Mr. Mayor: I don't care what notes are being taken. I am looking to the point of understanding. I think that she came here; she'd have [had] enough time with all the teamwork to have something before us to know what these guidelines she is going to talk about are.

That is all I am concerned about. I am not talking about the sharp people of Cambridge.

Mayor Vellucci: You and me are a couple of sharp minds.

Russell: I think we are all working towards the same goal and concerns as citizens of Cambridge.

Mayor Vellucci: Thank you.

Singer: Would you like to get my name and address?

Mayor Vellucci: No, we have that now. And your telephone number?

Singer: I am a biochemist on the staff of the National Institutes. I was one of the first to recognize and speak out publicly about the possibility of work on the recombinant DNA might prove hazardous. That was almost exactly three years ago. Since that time, I have been involved in a continuing effort of the scientific community and the National Institutes of Health to study and assess the potential hazards and to develop appropriate means to eliminate or minimize any chance that this research could result in any undesirable effects on people, other living things, and on the environment.

I am not a member of the Advisory Committee to the Director of NIH, the committee that developed the guidelines that were announced this morning. However, during the past year as that committee discussed and drafted several versions of the guidelines, I commented on and criticized their

work, particularly when I believed that the recommendations were not precise enough or strict enough.

Most recently I have served as a scientific advisor to the Director of the National Institutes of Health in his own evaluation and revision of the Committee's proposal. This evaluation and revision has been carried out with a large extent of public comment and several opportunities of public comment and that commentary has been analyzed in great depth by the Director of the National Institues of Health and his staff.

I am, myself, not doing experiments in recombinant DNA. It's my belief, in view of my concern, that the guidelines published this morning, which are binding on scientists working with NIH support, give an extraordinar[ily] high degree of confidence that agents which might present very serious hazards, should they prove to be hazardous at all, will not be released into the environment in significant amounts.

Before proceeding to describe briefly what the guidelines say, I would like to stress again that no agent known to be hazardous has been produced thus far in recombinant DNA experiments.

The guidelines themselves consider essentially all conceivable kinds of experiments and they classify those experiments according to the degree of potential hazard. That classification is made on essential[ly] two bases. One is the kind of DNA that is going to be

recombined into an organism and the second is the kind of organism.

The first consideration, the kind of DNA, speaks to the kinds of hazards that might ensue. The second consideration, the kind of organism, speaks to how likely it is that organisms can carry out a significant infection should it get out of the laboratory.

Some of the organisms required for experiments which are considered to be somewhat more hazardous than others need to be specially designed for the experiments. In their design [is] the intention of developing organisms that have a very, very low chance of living in any environment except very special environments that are supplied within the laboratory situation.

More importantly, I think, for public confidence, those organisms that are to be used in that way must be certified by the NIH Advisory Committee for use. They are not permitted to be used until they are so certified.

Those kinds of experiments that might result in the formation of very seriously hazardous agents are flatly prohibited by the guidelines.

Those experiments that were originally included in the voluntary moratorium called by the scientific community two years ago, and which were then considered to be a possible serious hazard, should they prove hazardous are still either prohibited in the current guidelines

or may be carried out only under the very strictest containment conditions, which are not relative to this discussion here because that is not the plan for the new laboratory, as I understand it.

The second group of experiments that might result in the formation of less seriously hazardous agents must be carried out under very strict containment conditions, that is, essentially absolute physical barriers must be set up between the experimenter and the experiment and between the laboratory and the outside environment.

After those two groups of experiments there are a group of experiments which appear in the assessment made by the National Institutes of Health to be less likely to produce hazardous agents, and if so, would be of a less serious nature.

These experiments can be carried out in P3 facilities, the type of facility which is under discussion here.

The facilities are designed to minimize the chance that the scientist may become infected by the agent in question and the facilities are such that the escape of organisms into the environment through the air or water or refuse is extremely remote--so much so, that it is difficult to put any number on it whatsoever.

Now, what kind of experiments should be conducted in a P3 laboratory? Those experiments which use organisms that are highly unlikely to survive should they escape and infect other living things,

that is, organisms which require particular conditions that they are unlikely to find in any other environment except in the laboratory, or those with which those experiments in which the recombined DNA has, to the best of current assessment, a very low probability of resulting in serious hazard.

Now, it's very important to consider how the guidelines will apply. The investigator in the laboratory has the initial responsibility for making an assessment of the kinds of containment security that he needs. He is also responsible for the training of staff and for accident plans, among other things. The institution itself, in this case Harvard University, has to certify annually to the National Institutes of Health that the facilities, the procedures, the practices, the training of those involved in the experiment have been reviewed and approved by the institutional biohazards committee.

Those committees are to be made up according to the NIH guidelines of a diverse group of people with different kinds of experience and expertise including experience in safety, in engineering, competence in applicable laws and regulations, competent to reflect community attitudes, and competent in the areas of health and environment.

The minutes of those committees must be available for public inspection according to the binding NIH guidelines.

Sir, that is a brief review. If during the course of the evening

there are any questions you would like to have answered about specific aspects of the guidelines, I would be very happy to answer them.

Mayor Vellucci: Since you represent the National Institutes, I noticed that each one of the speakers kept on saying, "should they escape, maybe", "low probability of escape", "unlikely" and "hazards." Why do they keep on injecting these words into their presentations? Is there a fear that there might be some possibility?

Singer: Sir, those of us who originally called attention to the possibility that there might be hazards and those that have been involved in the very careful analysis of this problem, have come to the feeling, the assessment on the basis of scientific data, that some of the conceivable experiments might indeed prove hazardous. Those experiments have been prohibited by the NIH guidelines.

Other experiments which might prove hazardous, and perhaps seriously so, are confined to the so-called P4 facilities. The experiments that are permitted in P3 facilities are those in which it is either felt that the DNA that is to be inserted is unlikely to make the recipient of that DNA a seriously hazardous agent. For those in which the likelihood that such an agent could possibly survive and grow to sufficient quantities to make a significant infection of another living thing is very low.

Mayor Vellucci: Thank you.

Clinton: Mr. Mayor, I would like to indicate--to me, I enjoy what they are saying as far as there could be some problems, because it indicates they are not here trying to throw us curve balls. I appreciate that, Miss. I am trying to learn something--which I will--from both sides here this evening. But, I think if things like this continue and no one is trying to kid each other, I think we are all a lot better off.

Mayor Vellucci: Councilor Duehay.

Duehay: Dr. Singer, could you tell us where else in the country this sort of research is going on in laboratories of this sort, the existence, and whether these laboratories in which the research is going on exist in heavily populated urban areas.

Singer: I will assume that you are asking me about those experiments which are going on in P3 facilities. There are many P3 facilities all over the country in universities and hospitals and in research institutions, as well as in industrial laboratories. I do not know precisely where recombinant DNA experiments are going on. There are various laboratories that I am aware of that are carrying out such experiments.

One of the problems has been that some experiments have not been carried out because of a voluntary moratorium and because the scientific community has been awaiting, to some extent, of publication of these

guidelines. Nevertheless, there are some experiments going on which, according to the voluntary guidelines that preceded this, would not have required P3 facilities which now must move into that, there are other experiments which have been going on in P3 facilities and will remain so.

Some of those facilities are in heavily populated areas, in various university and hospital laboratories in cities of various sizes.

I really consider that the likelihood that the experiments which have been assigned to P3 facilities could cause any kind of serious trouble is extraordinarily low. Having been concerned with this matter and with the safety of it for several years, I feel very comfortable with those experiments that are carried on in P3 facilities.

The fact is that the escape of organisms from P3 facilities will be extraordinarily low. Coupled with the use of organisms which cannot make sufficient infection in the numbers with which they are likely to escape, [that] gives me a great deal of confidence that these experiments do not present a serious problem to the public health.

I don't feel the same way about experiments that are to be carried out in P4 facilities.

Mayor Vellucci: Could you distinguish those experiments going on in P3 and P4 labs?

Singer: Yes. For example, if the DNA that is going to be put into an E. coli comes from a primate, from an adult primate, which is an animal closely related in various ways to humans which carries certain viruses that can infect humans, that experiment must be done in a P4 facility. If an experiment is done where the DNA is from an animal or a plant more distantly related to humans where the likelihood that it will carry agents that can infect and do harm to humans is lower, where the likelihood that the DNA itself would have an effect on humans is lower, those experiments can be carried out in P3 facilities with the combined use of an organism that is unlikely to carry out significant infection in the numbers that might be released.

Mayor Vellucci: This is an issue that apparently divided the scientific community. I wonder whether you have made any attempt to involve the considerable number of scientists of whom you were once in their number in the development of these guidelines, and whether, in fact, their serious opposition that apparently exists causes you some concern?

Singer: I must say that I've been surprised recently to find myself being put among those not concerned. I have been concerned, and I continue to be concerned. I feel that these guidelines are very responsive to that concern.

In the course of their development, opinion has been taken from many people. The whole deliberation within the National Institutes

of Health has been a very open process. The whole discussion within the scientific community has been an open process from the very beginning. There has been a great deal of opportunity, particularly this spring, for all types of groups and individuals to express themselves both in a formal hearing and through letters to the director of the NIH concerning their views of the situation.

The director of the NIH has spent the better part of the last three months analyzing in very great detail all of those comments. He then took those comments back to his advisory committee and asked them to reconsider certain aspects of the guidelines and there was a great deal of movement back and forth with, I felt, very serious attention paid to everyone's comments.

Mayor Vellucci: For the benefit of all the members of the City Council, I would like to inject this statement of questions, not to be answered at this time but for the benefit of members of this City Council who may want to ask these questions.

One. Did anyone of this group bother at any time to write to the Mayor and the City Council to inform us you intended to carry out these experiments in the City of Cambridge, and you just said that you had public hearings.

You plan to use E. coli in your experiments. Do I have E. coli

inside my body right now? That's a question. Don't answer, but you may, as you go along.

Does everyone in this room have E. coli inside their bodies right now?

Can you make an absolute, one-hundred percent guarantee that there is no possible risk which might arise from this experimentation? Is there zero risk of danger? Answer that question later, too, please.

Would recombinant DNA experiments be safer if they were done in a maximum security lab, a P4 lab, in an isolated, non-populated area of the country? Question.

Would this be safer than using a P3 lab in one of the most densely populated cities in the nation? Question.

Is it true that in the history of science mistakes have been made, or known to happen? Question.

Do scientists ever exercise poor judgment? Question.

Do they ever have accidents? Question.

Do you possess enough foresight and wisdom to decide which direction the future of mankind should take? Question.

The great war poet Joyce Kilmer once wrote, "Poems are made by fools like me, but only God can make a tree." I have made references to

Frankenstein over the past week, and some people think this is all a big joke. That was my way of describing what happens when genes are put together in a new way.

This is a deadly serious matter, Sir, Ma'm, Sir, Harvard University. This is a serious matter. It is not a laughing matter, please believe me. It is not a laughing matter, and this is for the National Institutes: this is not a laughing matter. If worse comes to worse, we could have a major disaster on our hands. I guarantee [to] everyone in this room that if that happens no one will be laughing then.

Protecting the health and safety of the people of Cambridge is a solemn trust. I intend to treat that trust with complete dedication and, Madam, it was only twelve years ago that I sat in that seat with the City Council full to capacity, as full as it is tonight, fighting the coming of the NASA site in Cambridge. And I predicted that that whole thing would collapse, and it collapsed.

And now tonight I come here with the same fight in me.

Now those are questions that you can all inject, people in the audience, if you made notes, you can interject all these questions to this presentation that's being made here tonight. I want to thank you.

Graham: Mr. Mayor.

Mayor Vellucci: Yes, Councilor Graham.

Graham: I have a question. Mr. Ptashne, in describing your facilities, P1, P2, P3 and P4, I am getting the feedback that this experiment is really not that hazardous. You go from P1, designed as an ordinary laboratory; you go to P4, a highly contaminated laboratory; then there is stuff in the middle, P3, designed as a moderate contaminated laboratory.

Why then, if you are telling us that these chances of anything happening are so low, extraordinarily low, why isn't it in a P1 facility?

Ptashne: I think in answering the Mayor, perhaps I can answer one of your questions. As far as we can tell, as far as we can estimate, the chances of danger from those experiments are extraordinarily low. As the Mayor indicated, scientists are not infallible, and because I think in this case scientists are being extraordinarily responsible to the possibility that they may have misjudged the probabilities in this case, that an extraordinary degree of protection is built in beyond what is believed to be necessary.

Graham: What you are actually saying is that there is a great possibility that we cannot keep it contained and it might infect the general public.

Ptashne: No.

Graham: With all the research that is being done in Cambridge and across the world, across the country today, why is one such a controversy among the scientists? I have had several phone calls from scientists--from people who are affiliated with Harvard and MIT, who have never called me before on even nuclear experimentation which is being done within the walls of MIT. Why are scientists calling us, the City Council, putting it in our laps to deal with this when all these other experiments are going on that we have no knowledge of? There must be somewhere in this controversy, or in this split, some kind of danger to the public at large in the City of Cambridge. This makes me wary--very much because you're just telling me well, there's, in your theory--oh--the chances of the public being hurt are extraordinarily low, but I don't know what to deal with. It might be low in this case, but what else do you deal with that is really highly contaminated? So your philosophy, your theory and my theory, I don't think coincide.

Ptashne: Maybe I can just comment on the first part of your question and ask Dr. Singer, who has had a lot of experience with people with different views on this subject, to answer the second part. Consider for a moment the implication on the first part of your question. You said that we're building an expensive and quite highly-contained laboratory; therefore, the experiments must be dangerous. But the implication of that is that had we not bothered to build this facility,

had scientists not bothered to worry about the regulations and guidelines you would assume they were safe.

Graham: I don't assume anything because I don't know what's going on anyway; I don't think half of us know what's going on in this country today.

Ptashne: I agree with that, but I can only reiterate that I believe, and, I believe Dr. Barkley, who is an expert on matters of containment and safety, and Dr. Singer would agree that the vast majority of informed opinion believe that these experiments per se are not dangerous, but because of general considerations of welfare and because of the remotest possibility that something might be dangerous, these very elaborate laboratories, P3 laboratories, which will greatly decrease the release of organisms to the outside world are being invested in and research is being restricted in certain cases to those laboratories. If providing an extra measure of protection so that I believe, as I said before, and I wish I could make this clear to the Mayor, you can never say that any biological experiment--well, almost any biological experiment--that there is zero risk. I believe these experiments done under these extraordinary conditions will probably have less risk than many of the experiments that now go on in every university and every hospital and every research institution in the country, and that those risks are significantly less than the risks you live with everyday involved in crossing the street, involved in having all of us in this

room, involved in owning pets, and so on.

Graham: Is it as simple as all that?

Ptashne: That is, in my opinion, as correct as any simple statement of the facts can be. May I ask Dr. Singer to respond to your second question: Why are scientists now making this particular fuss, and what are you to make of that.

Singer: I'm sure that it is a very difficult problem for you, Councilor Graham, as well as for many others, that there is disagreement in the scientific community. The reason that there is disagreement is that we don't understand all the things that we need to understand to allow all of us to agree. There are too many unknowns. The request for guidelines for these experiments, the voluntary action on the part of the scientific community several years ago, was a response to that lack of knowledge in a very real sense, and what people were saying was that if there is any chance that these experiments are dangerous, we ought to think very hard about how we're going to do them before we do them, and that hard thinking has gone on during the past two years.

Now there is a very broad spread of views in the scientific community. There are some scientists who think that these guidelines are silly because there are no risks. There are some scientists who feel that the guidelines are not strict enough because the risk may be

greater than the guidelines imply. Putting together the various opinions which Dr. Fredrickson, the Director of the NIH, has accumulated over the last month, I think it's not unfair to say that by far the largest group of scientists and, indeed, many of the public members of his Advisory Committee felt that the guidelines were an adequate response to the nature and assessment of the hazard in terms of securing public health.

Graham: Mr. Mayor, I am still wondering why this has been dropped in our laps. There must be a great division that now the political world--us who are known to make crazy decisions--now has to settle an issue in the scientific world. There must be something terribly wrong going on that nobody knows what kind of guidelines should be adhered to and that we are going to have to make that on the basis of--excuse my language--national security? (I hate using that word.)

Just let me say something because we're not scientists, and my God, in almost five years of being on the Council I never thought I would have to make a scientific, political decision, but I guess it has come to that point, that the scientific world cannot make their own decision and is asking for help to protect the citizens of this city and of the nation, and I think anything that dramatic--and I think this is really dramatic--that the scientific world has come to the political world and said, "Look. We want you to make our decisions for us. We want you to stop; we want you to not give them a building permit."

There are all kinds of things the City can do not to build that facility. I don't understand why it is being placed in our laps if the risk is so low or there is almost zero chance of anything happening to the public that we have to make that decision. That makes me leery of what kind of experiments this is really all about because even in a nuclear experiment they never came to the City Council for us to make those decisions, and that's all I have to say. I think this is more dramatic than I ever expected it to be. [Applause]

Ackermann: Mr. Chairman, Mr. Mayor, could I ask a question?

Mayor Vellucci: Yes.

Ackermann: Dr. Ptashne, you are the director of this lab; are you the director of this lab?

Ptashne: I mainly oversee the lab.

Ackermann: No, no, Dr. Ptashne, are you the director of the department at Harvard?

Ptashne: No.

Ackermann: Who is the director of the department at Harvard?

Ptashne: There is a chairman of the department; that is Dr. Meselson.

Mayor Vellucci: Are you dumping any chemicals in our sewer system at

the present time--or past experimentation, have you been dumping any chemicals into our sewer system?

Meselson: Are you talking to me?

Mayor Vellucci: Yes. Have you been dumping any chemicals into our sewer system?

Meselson: Let me first identify myself. My name is Matthew Meselson. I am the Chairman of the Department of Biochemistry and Molecular Biology at Harvard, and I reside in Cambridge.

Of course chemicals are introduced into the sewer system by operations of many of the departments of Harvard, as well as by many industries and other educational and industrial organizations in Cambridge; that is true.

Mayor Vellucci: Wasn't that the reason that Mr. MacLeod was invited to your meeting and not for a meeting pertaining to this particular thing, and the subject happened to come up while he was there talking about the chemicals that were being disposed of in the Cambridge sewer system?

Meselson: Sir, as Chairman of the Department, I am not involved with the Safety Committee of the University, and that question ought more properly to be addressed to Dr. Branton.

Mayor Vellucci: Come forth, Sir. Sit there and tell us. This is important.

Branton: No. Mr. MacLeod--

Mayor Vellucci: Mr. MacLeod is here, you know--

Branton: --was invited to attend our meetings, and I sent to him a description of what my Committee does. The description is essentially the same as the description that I gave you. In other words, I told him what we were doing, what we were considering in my Committee meeting, and cordially invited him to attend.

Mayor Vellucci: Did you discuss the disposal of chemicals in the Cambridge sewer system?

Branton: Not to my knowledge; no, we had no such discussion.

Mayor Vellucci: You might have been in the other room.

Branton: No, I was not in any other room when anyone . . .

Mayor Vellucci: Well, this is the information that was just sent up to me, that there was a conversation taking place on the disposal of chemicals in the Cambridge sewer system and this other question came up while you were talking about it. Now, do you dump any chemicals in the Cambridge sewer system?

Branton: Let me answer your first question, Mr. Mayor. I have not met Mr. MacLeod; I wrote him a letter and cordially invited him to attend

our meetings. He did not--

Mayor Vellucci: When was this?

Branton: At the beginning of May.

Mayor Vellucci: Of this year?

Branton: Of this year. I did not see Mr. MacLeod--

Mayor Vellucci: You saw his representative; did you talk to his representative?

Branton: Certainly I spoke to his representative.

Mayor Vellucci: Did you talk about dumping chemicals in the Cambridge sewer system?

Branton: No, we did not discuss it.

Mayor Vellucci: You did not. Do you dump chemicals into the Cambridge sewer system?

Branton: As I think the chairman of the Biochemistry Department has just explained to you, naturally chemicals are dumped into the sewer system by us, by industry, by--

Mayor Vellucci: I am asking you if you dump chemicals in the Cambridge sewer system.

Branton: Certainly I do.

Mayor Vellucci: Okay, then we will send some investigators down there to check out just exactly what you are dumping in[to] the Cambridge sewer system.

Branton: Certainly, I will welcome them.

Ackermann: Mr. Mayor?

Mayor Vellucci: Yes, Councilor Ackermann, please.

Ackermann: I'm interested in the composition of all these committees. Dr. Singer, one of the things I want to ask you is, you said that these NIH guidelines would be mandatory on all people doing experiments funded by NIH.

Singer: That's right.

Ackermann: Suppose they were doing experiments not funded by NIH?

Singer: The NIH--the responsibilities, the legal responsibilities and the legal power, that is, the legislative power given to the NIH--do not permit it to guide or regulate in any way any experiments other than those which are funded under its programs.

Ackermann: Say they were funded by the National Cancer Institute . . .

Singer: The National Cancer Institute is one of the National Institutes

of Health and therefore it is included. But, for example, work supported by the National Science Foundation would be separate and the NIH does not have the ability to regulate such work in any way. Therefore the director of the NIH has undertaken to bring various other federal agencies into his discussion to inform them about the guidelines and to request that they undertake in those agencies discussions that might lead to the adoption of the guidelines for all research that they sponsor. There are indications that the National Science Foundation will do so in the very near future. There are also indications that other agencies which sponsor such research may also use these guidelines or some modification thereof at some time, hopefully in the not too distant future.

Ackermann: But it still is a subject of some concern to you?

Singer: It is a subject that is of great concern to the director of NIH.

Ackermann: And to you?

Singer: Pardon me?

Ackermann: And to you, personally?

Singer: Yes indeed.

Ackermann: Let me ask you. A couple of my colleagues have mentioned

the question as to whether this kind of experiment on any level ought to be done in a crowded city. What about the special dangers of doing it in a university setting with two things, the kind of carefree attitude that I heard so well described at the hearing I attended last month with different levels of security by different professors and different graduate students--what about those special dangers?

Singer: In my opinion, there is no question but that in the past, experiments have been done in many places in a manner which was not consistent with the safest procedures. It is one of my hopes that the discussion of the last two years within the scientific community has educated most of my colleagues and myself to be more careful and to be more rigorous in the procedures that we use. I think that that's one of the big advantages of this whole discussion: people are aware of safety problems that they were not aware of before.

Ackermann: Yes. But you didn't really answer my question. What about the special dangers of a university. We all know that in every university in each department there are individualists who have their own ideas as to what safety is and [as] to what safety isn't, as to what's silly and as to what isn't. There are also students who are young. Is it not true that there are special dangers in a lab in the middle of a university, here in a building that is frequented by--

Singer: Yes, there are two things that are, perhaps, responsive. I will respond to the first one and perhaps when Dr. Barkley speaks he will speak directly to the question of access to the laboratories and the traffic problem which is the one that you brought up.

But with regard to the practices within laboratories, I think that the requirements on the institutional biohazards committee that are included in the guidelines, namely for certification as to practice, as to training, as to accident plans and the requirements that certification be repeated annually should go a long way to take care of the first kind of problem.

Ackermann: But it is a problem?

Singer: I think it has been, and my hope is that these guidelines will lead to a great improvement.

Ackermann: The professors are all going to come in neat little boxes now?

Singer: But with regard to the question of access, I think that is part and parcel of the whole definition of a P3 facility. The question of access--that would best be left for Dr. Barkley's description of a P3 facility.

Ackermann: Some people are suggesting that Harvard should be allowed to build this facility but should not build it in an old building full

of cockroaches and students. I want to ask you: You, yourself, did not serve on the committee that made up these guidelines?

Singer: I did not serve.

Ackermann: I want to ask you who did. It has been suggested to me that nearly all the people who served on it were people who had personal interest in seeing to it that such research did, in fact, continue. Is there any truth to that?

Singer: There are some members of the Advisory Committee who recommended the guidelines to Dr. Fredrickson who are involved in recombinant DNA research. There are other members of that Committee who are not involved, nor do they have any plans to be involved in recombinant DNA research. The problem constituting a committee like that is an extremely difficult one. This work is very new; it involves new concepts; finding people who are qualified both to understand the science and to understand the safety problems in a manageable-size committee is not easy. Therefore, I think it's not surprising that some of the people on the committee are involved in such research. Some are not.

Ackermann: Aren't most of them?

Singer: Pardon me?

Ackermann: Aren't most of them, actually?

Singer: It's my impression that it divides up about half and half.

Ackermann: That is not my impression, but I may have been misinformed

Singer: Right. Uh--

Ackermann: It is interesting. This is probably run into all the time. People really don't trust real estate brokers to be assessors, but nobody else knows how. People don't trust policemen to police themselves, but the police think they know best about it. People don't trust doctors to monitor other doctors where there is a self-interest. I generally come out for letting the educated layman in there even if it's slower; it may turn out better in the long run.

Singer: Well, I think the people involved on that Committee are aware of these problems. When the Committee was initially set up, the problem of getting people who understood a sufficient amount about the experiments was a problem. This mix is what evolved.

The committee itself, interestingly enough, voted at its very first meeting to request the National Institutes of Health to put public members on the Committee. At present there is one such member; he is a man named Emmett Redford, who is a professor of political science at the University of Texas, and he is a member of the Committee. There are others who are lay members who have been proposed but have not yet been formally assigned to the Committee.

Ackermann: That's a move in the right direction, and I'd like to move to the local scene and the committees and I'm not quite sure how many committees there are. There is, Dr. Ptashne--there is the University Safety Committee; is there also a biohazards committee, or is there only one local committee?

Ptashne: That's the one and the same committee.

Ackermann: That this is one committee and does it consist as charged, at the one meeting I went to, does it consist of people all of whom have a personal interest in some kind of research? I guess the question--let me table that question for a bit.

Mayor Vellucci: For the information of the people out in the hall, speaking is Councilor Ackermann.

Ackermann: Thank you very much. I want to table that question and get into a different kind of subject.

Ptashne: Can I just correct one thing, please?

Ackermann: Yes, please do.

Ptashne: There are, in fact, two committees that might be relevant to any research; any experiments that might be done must first pass the Biohazards Committee chaired by Dr. Branton.

Ackermann: Yes.

Ptashne: Any such experiment can then be questioned on [the] general grounds of ethics or morals or whatever in front of another committee, a University-wide committee called the "Committee on Research Policy." It was before that Committee that you appeared a month ago.

Ackermann: That's right. I see. So there is a certain monitoring from within--

Ptashne: That's true.

Ackermann: --which can address itself to that Committee.

Ptashne: Yes.

Ackermann: I want to ask you whether experiments on recombinant DNA have not been--being conducted, as a matter of fact--in the Harvard labs?

Ptashne: As I stated in my opening--

Ackermann: Yes, I know you did; I just want to get back to that. They are certain now that such experiments are being conducted?

Ptashne: Yes.

Ackermann: Some of them are being conducted possibly by MIT; possibly at the Harvard Medical School?

Ptashne: Definitely, not possibly.

Ackermann: Would you classify those as P1-type experiments or hasn't anybody looked to see?

Ptashne: No, within my laboratory, for example, P1-type experiments go on and in Dr. Meselson's laboratory, P2-type experiments go on--

Ackermann: And what's going on at the Harvard Medical School?

Ptashne: The Harvard Medical School--I think it reaches up to P3 laboratories. There is a P3--

Ackermann: And they have a P3 lab over there. That's in Boston so we don't keep tabs on that. There are, in fact, other experiments, many other kinds of experiments in your very diverse laboratories that some people might consider hazardous.

Ptashne: Is that a question?

Ackermann: Yes, that is a question. Or on which the [Bio]hazards Committee feels necessary to sit.

Ptashne: Well, I think the best way to answer that is the general class of experiments that will be--let me put it this way: the whole class of experiments involving tumor viruses, animal viruses--

Ackermann: Tumor viruses, animal viruses . . .

Ptashne: Animal viruses are viruses that grow on animals or animal cells opposed to the viruses, for example, that I work on which grow only on bacteria. Okay? There is an entire building at MIT devoted to the study of tumor viruses. These are viruses that cause tumors in animals. Harvard, for incorrect or correct reasons--at least the College--has chosen not to allow work with any of these organisms until higher-level containment facilities were built.

As soon as these facilities are built, as I indicated to you, the primary, immediate, and in fact only definite purpose of this laboratory that we're building is for experiments with these tumor viruses in animal cells even though that is not required by federal guidelines. Those experiments will still, then, have to be judged by the Safety Committee.

I think that most of the experiments--now here I have to think a bit--all the other experiments that go on, I think it would answer it as I believe the Safety Committee is taking a survey of all the experiments going on in the laboratories to find out what might or might not have to be regulated.

Ackermann: Okay. Now I want to get back to my question, which was: do the people who serve on the Safety Committee, by and large, have some interest in one or another of those experiments?

Ptashne: I really think Dan [Branton] should answer that question.

Ackermann: I wouldn't raise it if the question hadn't been raised by somebody else at the meeting I attended.

Ptashne: Well, first of all there is representation from the employees. Correct, Dan?

Branton: I didn't hear you.

Ptashne: Is there an employee representative on the Committee?

Branton: I recommended that there be an employee representative.

Ptashne: Yes, I believe the committee has representatives from the Harvard Medical School and the University--

Ackermann: Does it include people who are interested in public health, people who are interested in communicable disease, public health?

Ptashne: Well yes. Dan, why don't you--

Branton: Yes, the Committee definitely does include people who are interested in public health--

Ackermann: Whose main interest is public health?

Branton: Whose main interest is public health, yes. Dr. Benjamin Ferris,

who in fact is Director of Environmental Health and Safety and a professor of public health, is a member of the Committee, as are professional epidemiologists members of the Committee.

Ackermann: Thank you. That's the answer to my question. I would only suggest, Mr. Mayor, that we request not only one representative on that committee and a similar committee which I am sure exists at MIT. I think that you're thinking the same thing that we're thinking which is that indeed the City of Cambridge is very concerned and very involved in many of these decisions and there ought to be more than token representation. I would suggest, even though it's slower, I think there ought to be people on there who are really lay people--maybe lawyers--people who are accustomed to understanding difficult questions but who do not personally have any, who aren't accustomed to talking about the interests of scientists among themselves. I think there should be--I would say that a committee that was dealing in matters which are even one-millionth of one percent dangerous, ought to involve at least half public representation.

Branton: Well, I certainly agree with you and that's why we made such an attempt as we did to discover who the Commissioner of Public Health in Cambridge was.

I'd like to also emphasize that our committee is not a closed

committee. We don't operate in secret. Our minutes have been available; our meetings have been open and numerous people have attended our meetings at their own wish or have asked me to be invited and I have invited them and they have been free to speak at those meetings.

Ackermann: I don't want to suggest that you have been trying to hide anything. I think very often we've all been accused of trying to hide things, and it's just the people haven't--I mean, you don't know where our Commissioner of Health is. We weren't trying to hide that from you. I'm just saying that I'm kind of glad this has all come out because we--you live in our city and we are very concerned, probably not only with this but with other matters, for instance what you put in the sewage, as the Mayor said.

Mayor Vellucci: Harvard's presentation has now been for two hours. I would like to announce that Mary Frackelton, Executive Assistant to Senator Edward Kennedy, is in the audience taking notes to report back to Senator Kennedy. Will you please rise, Mary? Is there a representative here from the Massachusetts Department of Health? Anybody here from the Massachusetts Department of Health? What is your name, Sir?

Madoff: I am Morton Madoff.

Mayor Vellucci: Madoff? Dr. Madoff, the Massachusetts Department of Public Health. I just want to let the audience know who is inside this room watching out for us.

Clem: Mr. Mayor.

Mayor Vellucci: Yes, Councilor Clem.

Clem: Dr. Singer, you're with--are in association with the National Institutes of Health which, I gather from your testimony, is responsible for the funding of this type of research. Is that correct?

Dr. Singer: The National Institutes of Health funds the bulk of such work in the United States, but not all of it.

Clem: Your organization, therefore, is obviously quite interested in the development of this research.

Dr. Singer: Yes. I think that the organization takes the view that the opportunities that are afforded by these new techniques have extraordinary promise in terms of meeting the missions and the goals that have been given to the National Institutes of Health by the Congress.

Clem: It is also your organization that is responsible, or at least has taken responsibility for effecting guidelines on this type of research.

Dr. Singer: That's right. That responsibility was assumed upon the request of members of the scientific community. I was part of that group that made that request. I was also an employee of NIH at the time so that my status is a little bit muddled in that respect. But the NIH has assumed this responsibility at the request of the community.

Clem: So not only is your organization responsible for promulgating this type of research, it's responsible for regulating it.

Singer: Under the present circumstances, the National Institutes of Health is the only government institution which has taken on a serious consideration of this problem. There are obviously, obvious difficulties in this. The National Institutes of Health does not have available to it certain kinds of methods of enforcement; certain kinds of sanctions are not within its power. Within its restrictive power it has undertaken to try and assure that this research will be carried out in the safest possible way.

Clem: Dr. Singer, do you believe personally that there could be civilian control over the military?

Singer: That's a very difficult question for me to answer personally since I have come as an employee of the National Institutes of Health and it's a question which obviously is surprising to me because it's something that's not right on the topic.

Clem: Well you see, I think it is on the topic because I think that is, in fact, the fundamental issue here. I really don't give a damn about a P3 laboratory at Harvard University because I can't visit that laboratory and discover whether it's P1, P2 or P4 or whatever. I don't have the expertise to analyze or investigate any type of laboratory facility at

Harvard University. But it strikes me as very to the point that there is an important principle in this country that the people who have a vested self-interest in certain types of activities should not be the ones who are charged not only with promulgating it but regulating it. [Applause] This country missed the boat with nuclear research and the Atomic Energy Commission and we're going to find ourselves in one hell of a bind because we are allowing one agency with a vested interest to initiate, fund and encourage research and yet we are assuming that they are non-biased and have the ability to regulate that, and more importantly, to enforce their regulation.

Singer: Now that I understand your question better, I must say that I share your concerns over that. Nevertheless, it is true that the National Institutes of Health thus far has undertaken the most serious analysis of this question. There are, however, additional activities that are underway, and I might explain one of them.

There is presently in the Congress a bill which has passed the Senate which is essentially a renewal of the bill that established the Commission for--I have to get the name right, which I never do--but it is the commission that concerns itself with the rights of human subjects in biological and behavioral research. The new bill reestablishing that commission changes the commisson's nature so that it is no longer simply an HEW commission but a national commission. The bill was introduced by

by Senator Kennedy in the Senate; it has passed the Senate; it has not yet passed the House.

There is specific language in that bill which makes it a specific responsibility of the commission to concern itself with experiments on recombinant DNA and should the commission deem it appropriate to undertake specific action and development of guidelines for the conduct of such research; I think that is the beginning of an answer to your concern.

Clem: You see, the problem that I have with that statement is that I can accept at face value your statement that the National Institutes of Health has gone further than anyone else in trying to establish the appropriate guidelines and procedures. But I submit to you tonight that that's not far enough and that it is not worth that so-called hypothetical risk to toy around with this idea without calling a moratorium on it until we have a better set of guidelines. [Applause]

Singer: Councilor Clem, I tried to indicate to you that in my view, personal view, the present guidelines which prohibit those experiments which are deemed to be of the greatest possible hazard and which assigned to P4 facilities another group of experiments are responsible, but I do agree with you that these questions are important public matters and need to be discussed in a wider audience. The problem was made public by the scientific community three years ago. It has had extraordinary coverage in the press. I would have anticipated that by now we might

have had other action but we have not had any.

Clem: Well, I hope that the action that was initiated by this City Council will begin to raise the consciousness of the appropriate individuals throughout the country to do that. Notwithstanding that I have some very difficult problems in being asked to conjure up enough faith in federal guidelines that the protection and welfare of this community is going to be afforded by those guidelines. This room would be filled to the top with federal guidelines that are not even close to being implemented or enforced, but they exist and I'm sure someone with full faith and confidence thinks that they are being enforced and that they are serving the public interest.

I find it strange that Dr. Ptashne on the one hand asserts that the reason that we want to do this research is that we don't know enough about the organization of DNA in higher organisms, and yet he has, and his colleagues have, enough knowledge to establish that the risk is minimal. Now that to me seems to be a contradiction in terms. How can we establish--how can we establish--

Ptashne: Can I say something in answer to that?

Clem: Yes.

Ptashne: In answer to that, look, if one took that attitude one would do no experiments. Before we knew about how genes were organized in

lower organisms we would make the statement, we do not know how genes are organized in lower organisms. We do not believe there is a significant risk in doing those experiments. They are two quite different questions and there is no reason you should assume that the risk is related to what we know about the organization. Had we taken the view that we had to know in advance that organization, we couldn't have done that experiment, that series of experiments, or, in fact, any experiment in the history of medical microbiology.

Clem: Well, it's interesting that you fall back on science when you want to fall back on it to explain something, and yet you make the absolutely ridiculous statement that the risks are hypothetical, as if that's something bad, that people are against you because the risks are hypothetical.

Ptashne: No, no, no. What I mean by saying they are hypothetical is quite precise, namely that unlike dealing with known pathogens, no one has ever shown that a recombinant DNA experiment can result in the production of a pathogen. Do I make that quite clear? It's hypothetical in the sense that nothing has ever been demonstrated to be dangerous.

Clem: All right. Now you made a statement, "there's no known dangerous organisms [which] has ever been produced by a recombinant DNA experiment."

Ptashne: Yes.

Clem: Now just what the hell do you think you're going to do if you do produce one?

Mayor Vellucci: Don't put it in the sewer.

Ptashne: The point is, sir, that as near as we can tell, the probability that that event will occur is extraordinarily low. Now I know that you don't like to hear scientists telling you that there are certain risks involved but that they are extraordinarily low. I can only tell you that what is meant by that is that the risks are less than the typical kind of risks you engage in every day, in walking across the street--you can disagree with the statement, but this is the point that I'm making--in my estimation and in the estimation of the people who made these guidelines, the culling of the enormous scientific input into making those guidelines, the experiments that go on in a P3 laboratory will, on the whole, have absolutely minimal risks, meaning less risk to you than many of the activities you are engaged in now.

Clem: You haven't answered my question.

Ptashne: To wit--

Clem: Risk does not mean that something won't happen.

Ptashne: Yes.

Clem: It suggests the probability of its happening is slight, or whatever; is that correct?

Ptashne: It means the probability of something dangerous produced is extremely low.

Clem: Okay. But it does not say that something dangerous will not be produced.

Ptashne: Well, sir, that may be said about any experiment.

Clem: Right. That is my question: So what are you going to do if you produce an organism that you know will be dangerous?

Ptashne: Well, the answer to that is that it will immediately be destroyed.

Clem: And you submit that research in a P3 laboratory gives you that kind of control that once you produce that type of organism you can control it and stop it?

Ptashne: Let me tell you this. The reasoning behind a P3 facility is that our knowledge of the process of infectious diseases indicates that the probability you will be infected by a pathogen is proportional to dose. If, for example, the pathogenic organism were, contrary to all

expectations, were to produce, the chances that you'd be infected by that organism depends on how many you had ingested. If you ingested a hundred million, you'd be much more likely to get infected than if you'd ingested a few, on the order of a hundred or a thousand. The purpose of the P3 laboratory is to do just that for you. It prevents you from ingesting large amounts and it prevents large amounts from being extruded into the environment. The occasional organism, of course, will escape on an ant or on a person's clothing. Does that answer your question?

Clem: It answers my question but it seems to me that if you are so able to use some real common-sense knowledge that dosage might have something to do with it, that if a smaller dose is less likely to be as lethal as a larger dose, why don't you use some other common sense that says that we ought to do this research where there's fewer people around?

Ptashne: Well, sir, if the calculations were--if the reasoning were that the risks were serious for people, were more serious than the ordinary activity we engage in every day, then I would agree with that. I agree, for example, that P4 facilities should not be in a university. I think Dr. Singer agrees. I don't believe that to be the case with P3 type experiments, but it's another thing to make a plausible scientific argument why that should be done.

Clem: Well, I am obviously not able to make that scientific argument. I am not equipped in the knowledge to make that scientific argument; I am confident there will be later speakers who will do that.

Ptashne: What has gone on in the last two years in the public arena has been an attempt to get as much information as possible to make the decision as to what type of experiment should be done in a P3 laboratory, tested, what can be produced at minimum possibility to do anyone any harm. That has been debated for two years and that has been settled now.

Clem: I have never known a set of federal guidelines that were produced and weren't immediately subject to changes and revisions through practical experience. It appears to me, notwithstanding that we're asking an organization who is responsible to create this type of activity to encourage it, to expand it, to develop the guidelines. That has to me an inherent conflict of interests. You certainly wouldn't want the Cambridge City Council to develop a guideline for reelection, any more that you'd want the generals running the military.

Ptashne: Sir, it's in NIH's interest NOT to allow dangerous experiments, that is just the point. If these guidelines are to be modified they should be modified in accordance with experience.

Clem: Well, I am not satisfied by that argument. On the one hand you're indicating good faith which I accept; I accept that measure of good faith.

But I am not impressed with the Biological Hazards Committee when it invites the Commissioner of Health which we haven't had for eighteen months and continues to call the individual a doctor who doesn't have a doctorate. And a committee in research policy is supposed to be interested in moral and human issues and have never taken the time to come to the Cambridge City Council to explain some of the issues before us in dealing with this research at Harvard. I am not impressed at all by that track record.

Ptashne: If you ask me whether the experiments we do in a P1 laboratory have absolutely no risk, no, I could not say there is absolutely no risk. The greatest group of scientific analysis has been completed, if what has been assigned to a P3 laboratory affords an enormous degree of safety as far as the people working with it and outside. Just because one can say things like the risk is not zero, does not mean there is any real danger.

Clem: Well, I will conclude my remarks by saying that by your own admission of the three laboratories proposed, a part of only one of them involved any kind of recombinant DNA experiments at all. And I do not think that it is worth the risk of the City of Cambridge to allow that to go forward without establishing a moratorium on that type of research until all the elements in the entire, in the community, and the political community are heard.

Ptashne: Does that include P2, sir?

Clem: If you want my personal opinion, I don't think you have the business of doing it any way. That is my personal opinion.

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Mayor Vellucci: Councilor Clem, for your information, I have placed a resolution in the hands of the City Clerk. I'll read it so everybody can think about it.

> "WHEREAS: THERE IS STILL CONSIDERABLE DOUBT CONCERNING THE SAFETY OF EXPERIMENTATION DEALING WITH RECOMBINANT DNA, THEREFORE BE IT RESOLVED: THAT THE CAMBRIDGE CITY COUNCIL INSISTS THAT NO EXPERIMENTATION INVOLVING RECOMBINANT DNA SHOULD BE DONE WITHIN THE CITY OF CAMBRIDGE FOR AT LEAST TWO YEARS, AND BE IT FURTHER RESOLVED: THAT THE CAMBRIDGE CITY COUNCIL WILL DO ANYTHING AND EVERYTHING WITHIN ITS POWER TO ENFORCE THIS RESOLUTION."

And this will come up July 7th, 1976, and I am placing it in the hands of the City Clerk. (applause and boo)

Ptashne: If you pass that resolution virtually every experiment done by members of the Biochemistry Department at Harvard will have to stop and virtually every experiment done by about half the members of the biology department would have to stop including experiments that no one, sir, no one has ever claimed had the slightest danger inherent in them--namely recombinant experiments done under P1 conditions. And on such an important issue, it seems to me you have to clarify much more clearly what the issues are before proposing such a resolution.

Mayor Vellucci: What I want to alert you to, when I was a little boy I used to fish in the Charles River and I woke up one morning and found millions of fish dead in the Charles River, and you tonight tell me that you've dumped chemicals into the sewer system of Cambridge and the sewer system overflows into the Charles River. Carry on.

Duehay: I'd like to ask a question with regard to the governance issue at Harvard. The Committee on Research Policy and Biohazards, who do they report to, the faculty or the dean?

Branton: They report to the faculty and the dean.

Duehay: Has the faculty debated these issues?

Branton: Pardon?

Duehay: Has the faculty debated these issues?

Branton: There was an open meeting held by the Committee on Research Policy and there was also an open meeting, of a more scientific nature, called by my committee to inform ourselves on the possible matter of danger.

Duehay: But has there been on the docket of the faculty on Arts and Sciences a report from your committee which has been voted up or down by that faculty? What you're saying is you've had open meetings or hearings, but has this issue in fact been taken on by the entire faculty?

Branton: The regular faculty meeting establishes this. We have been working during the year and submitted our report just recently to the-- to my knowledge there has not been a regular faculty meeting.

Duehay: Why would the dean have made the decision and told the faculty--

Branton: I am not certain that I know how to answer that as well as Dean Leahy who is here in the audience.

Leahy: Mr. Councilor, the short answer to your question is that there has been no discussion, formal discussion in the Faculty of Arts and Sciences concerning research of this nature. But I might also point out that the only decision that has been made in the Faculty of Arts and Sciences to date, and for the University, is to authorize an expenditure of funds for the construction of a containment laboratory. No proposal for research surrounding recombinant DNA.

Duehay: You do expect these matters in fact to make faculty reports?

Leahy: My personal expectations, I expect they would at some point.

Duehay: On another matter, is it true that the biology department has land or Harvard has land that the biology department uses in Bedford and/or Lincoln?

Leahy: There is a unit in the biology department that has land in the Lincoln/Concord/Bedford area.

Duehay: And how many acres does Harvard own? Surrounding that biology department there?

Leahy: I would have to speculate on that.

Duehay: Several hundred acres perhaps?

Leahy: I am not sure.

Duehay: But it would be in the area presumably less crowded than Cambridge and presumably this experimentation could go on there?

Leahy: That is correct sir.

Duehay: But have you considered whether or not the experiments should go on there?

Leahy: The general issue of conducting research in a less congested facility than the Biological Laboratory, has been in the course of a number of deliberations of this whole matter--the responses to this issue are technical, based on technical assessment. I prefer to have someone with this knowledge--

Duehay: I am taking the general position, I think, although you might hear testimony that this research is pure research that may well relate to cancer research--I'm not sure that that necessarily means that it has to be done in the middle of a crowded city. It is this avenue that a search for an alternative location that I am looking for. Thank you,Mr. Mayor.

Mayor Vellucci: Anybody have anything else?

Clem: I have one further question, Mr. Mayor.

Mayor Vellucci: Councilor Clem.

Clem: Is there any precedent for requiring an environmental impact statement in any of your funding, Dr. Singer?

Singer: Could you repeat the question?

Clem: The question was, is there any precedent for requiring an environmental impact study to obtain your funding?

Singer: As you know, the National Environmental Policy Act requires an environmental impact statement or an assessment that leads to a decision as to whether or not you need such a statement for all major federal actions that might have an impact on the environment. In various ways the activities of the NIH could be so considered. But for activities ongoing prior to the establishment of the Act it has taken a certain line, to catch up with all those things as opposed to new actions. There are activities proceeding at the National Institute of Health directed toward the development of impact assessments for a variety of kinds of activities. The only one to my knowledge has to do with the construction of new facilities on the NIH ground in Bethesda, Maryland itself. With regard to the publication of the guidelines, the director of the National Institutes of Health, as he announced this morning, has determined on the basis of

assessment that this action, namely the publication of the guidelines, that we ought to have an environmental impact statement prepared. Such a statement is in the process of being prepared. It should be ready by September. Further indicated, however, if you are proceeding with the publication of the guidelines, even though the impact statement is not ready, because it will mean that the publication will result in an increased protection to public welfare over the existing situation which is simply voluntary compliance with a much less strict set of guidelines that were developed at the Conference on Recombinant DNA in Berkeley in 1975. Is that responsive to your question?

Mayor Vellucci: You know, we have environmental impact studies here in Cambridge on Kennedy Library that was proposed for Cambridge. In fact, you can't even build a single box without an environmental study, so why should you be any different? Can the City of Cambridge insist upon an environmental impact study before it allows anything of this within its city limits.

Singer: It is my understanding, sir, that the requirement of the National Environmental Policy Act is the requirement in connection with federal government action.

Mayor Vellucci: Well, they're going to get federal money, aren't they?

Singer: It means that the impact statement would be required on the part of the National Institutes of Health. And as I mentioned, that impact

statement is being prepared currently.

Mayor Vellucci: Well,--

Clem: Wait a minute, wait a minute. You said an assessment, not even a statement.

Singer: I am sorry, the Director of the National Institutes of Health announced this morning that an impact statement was being prepared.

Clem: That is being prepared for the guidelines only.

Singer: For this particular action. That is the only thing I can speak to you on. I am sorry.

Clem: All right, it seems to me that the Mayor is quite correct in saying that in the case of the federal proposal for the Kennedy Museum and since in fact the General Administration Services was responsible for that activity and it was in fact prepared to be federally funded, they were required to conduct an environmental impact statement for that activity, even though it was located in Cambridge. It was an actual proposed facility so it seems to me that there is precedent not only for an environmental impact statement for guidelines promulgated at the federal level, but also, over an individual project at local levels including the proposed facility at Harvard University.

Singer: I really am not in a position to comment on that. My introduction to the National Environmental Policy Act was in the recent past. And I really don't know enough about it to comment on that.

Mayor Vellucci: This was a committee, this committee of the National Institutes of Health that made and prepared this statement. Who put this committee together?

Singer: Do you mean the Advisory Committee to the Director that recommended the guidelines?

Mayor Vellucci: Yes.

Singer: The Committee of the National Institutes of Health, the director proposed the name of the members of the committee, in a formal sense, to the Secretary of the Department of Health, Education and Welfare who then appointed the members of the Committee.

Mayor Vellucci: Well, then a Committee was selected by the officers of this institute.

Singer: The Committee is an Advisory Committee to the Director of the National Institutes of Health.

Mayor Vellucci: Now, did they go out and seek some opponents who were against this thing and put them on the Committee so that they can clash and come up with an answer that would be the answer to protect--zero, for all the people--

Singer: The Committee we are talking of is essentially a technical committee which proposed to the Director of the National Institutes of Health

these guidelines. Upon his receipt of those proposals, those recommendations, he held a meeting of yet another committee.

Mayor Vellucci: Of another committee?

Singer: ... which is called the Director's Advisory Committee, which exists to direct him on matters of general policy. For this particular purpose, the membership of that committee was specifically expanded to include various members of the public. For example, there was a consumer advisor representative; there were several student representatives. That committee met for a day and a half in February which is about six weeks after the guidelines were given to the Director. That was an open meeting. In addition to the members of the Committee, various groups were invited to come. The meeting was announced publicly and was open to anyone. It was held at the National Institutes of Health.

Mayor Vellucci: What part of the year?

Singer: On February 5th and 6th of 1976.

Mayor Vellucci: And at that time did you know that Harvard was going to embark upon an experimentation?

Singer: I did not know that but there are --

Mayor Vellucci: Did your Institute know it?

Singer: It is my impression that those people within the National Institutes of Health who would be involved in the funding of such a facility

would. May I tell you a little bit more about this meeting --

Mayor Vellucci: Well you see, if it wasn't for some of these newspapers that we have around Cambridge, the Globe, the Chronicle, the American, the Phoenix and the Real Paper, we wouldn't have known nothing about this thing. We read it in the local newspapers. That is the first inkling that we thought that there was something going on at Harvard. And this is how we got involved here because we read it in the newspapers locally. We got nothing from you, nothing from the Senate, nothing from the Congress, nothing from Harvard, nothing from anybody. Do you think this is the way to run the govermment? That is why we are here tonight, as a matter of fact. You see, we caught Harvard. [laughter] This is my home and my land, sir.

Singer: I would like to say, among the people that came to talk at Dr. Frederickson's open meeting in February and among the people who filed statements were people from the community here. And their statements were part of the analysis--

Mayor Vellucci: Who was there? Who was there from my community in East Cambridge?

Singer: Now I don't know too much about where particular people live so that I can't specifically say they lived in Cambridge, but people whom I identify with Cambridge in an informal sense -- some such people were there.

Mayor Vellucci: Scientists?

Singer: Dr. Richard Goldstein was among the speakers there.

Mayor Vellucci: Dr. Vellucci -- was Dr. Vellucci there?

King: Point of information, Mr. Mayor. We called the Director of the National Institutes of Health and asked them whether a couple of women who worked in the dishwashing facilities at MIT could go down to the NIH and testify on this. And the NIH said that they didn't have funds to bring down those people. Those people couldn't afford to take a day off from work and they couldn't get down there.

Mayor Vellucci: Okay, now look it, we have gone two and a half hours with the presentation in favor. (List of names of people in favor read by Mayor. Members of the audience in favor gave their names and addresses.)

Ptashne: Mr. Mayor, Mr. Mayor, may I ask a question? Several quite prominent people have come and waited all this time to address you, as was agreed in the original program. Could they have two minutes of your time to state their position?

Mayor Vellucci: Why don't you just sit. We've heard all the arguments and I think we've got a pretty good picture of this whole thing. You made a good presentation. This lady made a good presentation. Everybody made a good presentation. The questions that were asked were good

questions and now we'll proceed to the other side of the coin and then we'll get some more information. Please, give us your name and address. (Additional names and addresses of people in favor.) And now we will listen to the other side. Is Dr. Hubbard here?

Hubbard: Yes.

Mayor Vellucci: Come forward please. Now it is not the intent to shut anybody off. We'll hear some of the arguments against it and as we proceed along we'll try and go back again and hear the others that came here to speak and this way we'll continuously get a balance and a good picture and a good argument of pros and cons--because if we let it go all night long on one side -- So you may rest assured that we will get some time on the opposed and then we will go back to those kind people that came in here. It is very hot I am sure, and we will come back to you. Your name and your address and your title and who you represent.

Hubbard: My name is Ruth Hubbard, I live at 21 Lakeview Avenue in Cambridge. I'm a Professor of Biology at Harvard. Since quite a number of us want to speak I'll be very brief. I would like to say just a very few words about why I'm opposed to this containment facility being built in Cambridge and at the Biological Laboratories at Harvard. The work on that is called recombinant DNA that's supposed to go on in that laboratory as you have heard involves taking genes from higher organisms and putting them into bacteria usually E. coli, a bug that lives in our gut and the

gut of all our domestic animals or birds, insects, in the soil and in the water. Wherever you look you find E. coli. It's all around us and in us. Ordinarily, it and we live together very happily and don't give each other any trouble. Occasionally, something goes wrong and then E. coli can cause disease. The transfer of genes from higher to lower organisms occurs rarely if ever in nature. We therefore have no way of evaluating the safety of this new technology that is in fact manufacturing new organisms, but we do know that genes sometimes act differently when they are in different environments. We therefore cannot predict how the genes of E. coli will act when foreign genes are put into it or how the foreign genes are going to act in E. coli but we do know that once these new organisms are made they will reproduce and spread and they cannot be recalled at will. Now it's proposed these experiments be done in containment facilities, so called, but everyone agrees that such facilities cannot in fact contain E. coli, that is keep it in, because it will inevitably be carried out by the people who work with it on their clothes, in their hair, on their skin, in their throat and it will be communicated by them to other people. It is quite possible that these people themselves will not get sick from these E. coli they carry but that when they come in contact with people who are more susceptible, like for example people who have just taken a course of penicillin that kills all the bacteria in their gut and who are therefore just in process of developing a new culture of bacteria, that they may take up large numbers of these new strains and may get sick. Another example, newborn infants have no bacteria in their

guts and gradually acquire them. Should people doing this kind of work be allowed to come in contact with newborn, should they be isolated from them, there are a whole host of questions that could be answered by working on animals and that we do not know the answers to at this time. The point is that we don't know and the people who want to go ahead with the work don't know because this kind of work has not been done before. The best course therefore is to be extremely cautious until we know more and particularly with coli because if a dangerous strain of coli gets going, and since it can live in us and in so many other places and can multiply rapidly, it can get all over the place before we even know it is out and after that we cannot call it back.

Therefore, I believe that if this kind of experimentation is going to go on, it should happen in one or a few highly monitored research facilities, not in places that are full of students and other people who have nothing to do with this kind of work and not in big cities full of people. If these experiments go on at Harvard, they will go on at many other universities, and we've been told they are already going on there. They will go on in commercial laboratories across the country that the so-called containment facilities will proliferate, there will be many of them and there will be no way of monitoring what happens until people begin to get sick.

Now I want to make just one other point. Some people, and you heard it here tonight, have begun to say that since all research involves delving into the unknown why single this work out as more dangerous. The

answer is simply this. The ordinary research that most of us do is unpredictable in the same way that I cannot predict what will happen anytime I go into the kitchen to bake a cake. But I'm pretty darn sure it's not dangerous--and this is true of most research, the recombinant DNA research is different because we're bringing together living elements that have not been together before and we therefore have no way of predicting what will happen. Thank you. [applause]

Mayor Vellucci: City Councilors, any questions?

Ackermann: Yes, I'd like to ask Dr. Hubbard a question.

Mayor Vellucci: Councilor Ackermann.

Ackermann: I'd like to know specifically what your concern is. Are you concerned about all DNA recombinant research, are you concerned about DNA recombinant research with E. coli? I guess those are the two parts of the question; what about your Level Ones, your Level Twos, your Level Threes and Fours?

Hubbard: Uh hum, Okay. I personally am concerned with all recombinant research that puts genes from higher organisms into E. coli. That includes P2 as well as P3. Now P2 really is not containment, you understand that. P2 means you work on your bench and you put a sign up saying I'm doing dangerous experiments here. P3 is really the first level at which a facility is built that has some margin of safety built into it. But

even at the P4 level we have along history of monitoring and even at the P4 level infectious organisms get out. So what I'm saying is that I personally am opposed to any work that puts genes from higher organisms into micro-organisms and particularly into E. coli.

Mayor Vellucci: Dr. Hubbard, Dr. Ptashne stated only a rather narrow range of recombinant DNA experiments requires a P3 facility. The question is if this is an experimental situation, how can a definite statement be made as to the level of protection needed; should we not perhaps take maximum precautions if we are to consider this facility at all?

Hubbard: I completely agree with you. My answer to your question is yes. I think that in a certain sense the past two years have been spent in erecting guidelines which to a certain extent is devising a language of dealing with these potential hazards. We have--the statement was made that we have acquired new information. The fact is we have acquired mighty little new information. There has not been nearly as active experimentation as we need I believe in order to know what the level of hazards are for the various combinations. I think this experimentation can be done. I think it can be done reasonably safely by going into one or two or three highly monitored facilities in isolated areas.

Mayor Vellucci: Do you have any suggestions as to where these isolated areas could be geographically, what part of the world?

Hubbard: Well, there are high level containment facilities; one of them

is at Fort Detrick, where the bacteriological warfare work was done.

Mayor Vellucci: Where?

Hubbard: It's Fort Detrick in Maryland where there is a P4 facility and where there is a history by now that tells us what level of containment one can expect even from P4 facilities. I would guess that one could find national laboratories as they exist in the atomic energy business at Oak Ridge or wherever, where one would be be in a city, and where one would not be dealing with a transient population going in and out of buildings, which population has nothing to do with these particular experiments.

Mayor Vellucci: Dr. Hubbard, could you explain why Harvard would like to have this almost in their back yard or in the Harvard yards. Why do they want it so close?

Hubbard: Well, I think you should ask the people who want it. I don't really think --

Mayor Vellucci: Do you have any guesses as to why they would want it close from your past experience?

Hubbard: Well, it's more convenient.

Mayor Vellucci: More convenient, that's probably the answer. Thank you. That's a good answer.

Hubbard: But I think you should ask them.

Mayor Vellucci: Yes, that's a good answer. Thank you. Yes, Councilor Graham?

Graham: I would just like to ask for my own--decision I will have to make in July. Would you say that the high precaution for these experiments can be--the reason they want to put it in a P3 facility is because, like when you build a bridge, and your load factor is much higher than what, much lower than what the bridge can normally hold--and what I'm talking about if they put extra cable on an elevator, just in case something might go wrong, they'd have a heavier cable so that it won't go wrong--is this what some scientists are trying to do, maybe it can go into a P2, but for extra precautionary reasons we're going to put it into a P3 for, you know, protection of the public? Or is it a P3 that really needs to go into a P4 into the middle of a desert somewhere so that the public safety is guarded? What I'm hearing on one end is that it possibly could go into a P2 but will go into a P3 and what I'm hearing you saying [is] that it should be in a P4, and an isolated area and not in a highly transient densely populated community.

Hubbard: I believe that the problem with answering your question is that we're all guessing. And the question of who guesses what depends on a lot of factors.

Graham: Thank you, that's what I would like to know.

Mayor Vellucci: Jonathan King, MIT, Cambridge in opposition. Come forward please.

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Sit down, give your name, your address, your title, don't give your background, just your name, address and title.

King: My name is Jonathan King. I live at 5 Gordon Place, Cambridge, behind the Stop & Shop. I'm Associate Professor of Biology at MIT. I'm a microbiologist molecular geneticist. I've been concerned with this issue for a number of years. I've worked with a group called the Group on Genetic and Social Policy associated with Science for the People, which is a Boston area group and on the faculty representative on the MIT Biology Workers Health and Safety Committee. I wonder if we could have some of the other people in opposition to come up here for our support.

Mayor Vellucci: Yah, give us Mr. Al Vellucci, where are you? Come on forward and sit over there. See we've got some brains in this city. This is Al Vellucci too. Sit down over there. Mr. Santini from East Cambridge, where are you? Where's the rattlesnakes around here? Every-time I turn around I hear some hissing.

King. In the first place I'd like to absolutely and publicly diassociate myself from that most of the biologists that Dr. Ptashne particularly continually referred to, that most of the biologists don't think it's dangerous, most of the biologists aren't concerned. Most of the ones I know would turn over in their sleep if they knew that was said about them in this issue. Now I'd like to go through five points, mostly with

respect to the Harvard presentation. One, we were told by Dr. Ptashne that small pieces of DNA introduced into E. coli are not likely to render it dangerous or pathogenic. This is absolutely false; it's well known in the scientific community that antibiotic resistance is associated with small pieces of DNA introduced into bacteria. These are called plasmids, the same ones that were defined by Dr. Ptashne at the Miles Symposium which took place at MIT last week, which was a corporate symposium to kind of push the benefits of this research. A number of scientists presented evidence showing that the pathogenicity of E. coli, the ability to make you sick, was explicitly associated with smaller elements of DNA, one of which allowed it to stick to your small intestine so it didn't get washed out, the other of which allowed it to make a toxin which absolutely made you sick. It is not true that introducing these elements into E. coli is not likely to render it dangerous. In fact, if anything, it is exactly the pieces of DNA that are being played with that are responsible in nature for the infectious aspects of bacteria. A number of other things that weren't mentioned was that one of the reasons that K12, E. coli strain K12, was used by microbiologists is it transfers its genes to other organisms. That's one of the reasons people study it. It doesn't have to populate your gut. It can transfer its genes to organisms that do populate your gut. This has recently been shown in transfer from both animals to human beings and in feeding experiments in which it has been shown that you ingest K12, they transfer their genes to other bacteria. Point Two, it was said that there was no danger of escape.

I'd like to go down on record as saying it's patently a false statement; in fact, it is absolutely certain they will escape since in the highest containment facility that ever existed in the United States where every single person associated with it was highly trained, there were 423 cases of laboratory-acquired infections in the time. And this is a situation where everybody who got sick, who got a cold, who didn't feel well, had to report to a physician who was specially trained and assumed that they were sick. Now I don't know how scientists can know that none of these organisms are dangerous because I know that Harvard does not, nor does MIT, have a program in which every person who works in a laboratory is regularly medically screened to make sure they haven't picked up a laboratory infection. How do you know when someone comes in and says, gee, I was out for the last few days. I didn't feel good, I had a bug, I had a flu --that it wasn't something picked up from the lab. They may be saints over in Harvard--in our labs people get sick. Even in our "innocent" experiments which are not recombinant DNA experiments, every once in a while we get a Salmonella infection, we get somebody seriously sick. With organisms you don't know anything about you won't be able to identify their symptoms. It might take twenty years before it gets into a bacteria which causes trouble. I don't possibly see how you can say, one, there's no danger of escape, when you know there will be escape, and, two, there's nothing to worry about. Now, with respect to that statement about there has been no documented case of the recombinant organism causing disease, may I give an analogy? Certainly the Manhatten Project scientists could have

said before the first explosion, there is no evidence that atomic bombs cause any damage. That was absolutely true. Right, until they had exploded one they didn't know. I'm sure it's true that there's no evidence that these organisms cause danger. The vinyl chloride industry for years said there was no evidence that vinyl chloride caused danger. The asbestos industry said for years that there is no evidence that asbestos caused any danger. Look at all these workers that haven't dropped dead yet. The argument that because we haven't seen the negative results means we shouldn't worry about it is absurd and is simply a way of, you know, of pulling the fog over the eyes. Now, I also don't see how a committee of people who believe that the stuff isn't dangerous can possibly protect my health. If you have a committee of people charged with protecting us from the danger and these people are willing to get up in public and say there's absolutely no danger; there's nothing to worry about; the facilities are super safe; the bugs won't make you sick; well that is the last person I am willing to trust in terms of my health and my danger. Okay. Now my fourth point, the guidelines. Dr. Singer talked about the guidelines. I'm personally super upset that a representative from the National Institutes of Health came here and made their presentation on the side of going on. Now, I was one of the people who had voiced their opposition; I wasn't put on the committee. I made a couple of suggestions about it. I could suggest a friend who might be put on the committee who was in opposition. I don't think those guidelines were written by a group of people who represented the public in all the interests. That was a group of people who

were essentially the protagonists; they were the ones doing the experiments. There is no reason whatsoever that to believe a democratically representative of the people, the scientific people at large, the public health community, the unions, anybody--those guidelines are like having the tobacco industry write guidelines for tobacco safety.

Mayor Vellucci: Dr. King, are you suggesting this was a stacked deck?

King: It was not a stacked deck.

Mayor Vellucci: It was?

King: No, it was not. In hindsight it was a stacked deck. It wasn't intentional. There wasn't any conspiracy. They mean well, they're working hard, they're trying to write good guidelines. However, since they believe the stuff isn't very dangerous, it's not surprising that the guidelines they write are a little bit lax compared to what many others of us believe. Now, these guidelines are minimal guidelines. There's nothing in them that says that you can't be a little more worried, that you can't take a stronger position. I think it's absolutely right and proper that the City of Cambridge get involved in this issue and recognize that when you have a situation that's gone astray at the federal level, you don't say, oh, well, the federal guidelines are there, there's nothing we can do about it, but you do step in. Now, the question was raised--Councilor Graham raised this question, about why was this in the political sphere. It's in the political sphere because it's a political issue. It's not a scientific

issue. Whether you use this pipette or that pipette that is a scientific issue. Whether you go ahead with the research, that is not a scientific issue. Okay. That is a social policy issue. The people here pay the taxes and they bear the risk and they're supposed to reap the benefits. Well, let them decide; let them decide. I don't remember taking part in any debate that said the United States is going to go ahead with genetic engineering research. When I heard about it I was really upset. Could I vote against some senator who had taken a position on it? No. Could I go to an NIH hearing? At that time there weren't any NIH hearings. It was pretty hard to get representation in those hearings. This country, this community has not decided that we should go ahead with this research. It is very dangerous, it's very questionable, and some of us who are scientists think that it's not the opposition who is interfering with the kind of freedom and privilege of scientific research, it's that subsector of the scientific community that's insisting they're going to go ahead with what they want to do even though everybody else is saying, whoa, don't do it, it's irresponsible, hold off. I think that the scientific responsibility, the action that represents kind of, you know, defending democratic process is to say no to the research until such a time as all the people have said, all people of the community have said, go ahead. I am convinced that when the people of the community understand the unbelievably unknown nature of the dangers, tampering with millions of years of evolution, and the very flukey nature of the benefits, and they're not benefits you couldn't get by other kinds of research, that

they'll say no, we don't want it. They'll say there are other ways of taking care of our health. There is other kinds of research that we can support that don't constitute those kinds of hazards and will benefit; we'll solve cancer; we'll get food in our bellies and keep cancer out of our lungs and chemicals out of the Charles much faster than by building super high technology genetic manipulation research. Thank you.

Ackermann: Mr. Mayor.

Mayor Vellucci: Councilor Ackermann.

Ackermann: Dr. King, how do you respond to the people who would say that if you ask the general public about nine tenths of the experiments that are going on nowadays they would say, why do they do that, why don't they do something more useful. In fact, why don't they not do that; it scares me?

King: I would often agree with the general public.

Ackermann: You think that's right?

King: Yes, I think in many cases that's right. If I look back on my own training as a scientist, certainly there was no component of public service responding to the needs, it was this thing about pure science. And the public doesn't understand. The public be damned. Don't worry about it.

Ackermann: Okay, let me ask you another question. If we hold up this

lab by the many techniques with which we are so skilled, that doesn't mean that there isn't going to be any more of the kind of research that you're afraid of. How do you see, how are you planning to carry on this crusade? And as a matter of fact, are you afraid of the type of research that was classified tonight as P2, P1?

King: I am personally, privately, organically afraid. I mean I just say it to you.

Ackermann: Yes, I gather that. But go ahead and answer my question, anyway.

King: Well, I don't, as a matter of fact there's not very much I could do at Harvard, okay. If the people at Harvard insist on going ahead with the research without the facilities, then it's going to have to be something like local people who will speak up.

Ackermann: Well, Dr. King, if they don't do it at Harvard, if they don't do it at Harvard College in a lab or not in a lab, they will still be doing it at Harvard Medical School, they'll still be doing it at, I bet, at MIT, they'll still be doing it at the University of California, the University of Minneapolis, what--

King: Councilor Ackermann, that argument seems to me like saying--why should we put--

Ackermann: Dr. King, I want you to understand me, it's not an argument.

It's not an argument. What I'm saying is, what are we really being asked to do. What are you really trying, to whom are you really trying to reach through this public forum? I'm as concerned as anybody else about the citizens of Cambridge. I also have a strong feeling that if any really funny thing came up, it would cross the river and it would be in Los Angeles, it would be in India, before we had thought about it much. So it's more, if it is a hazard, it is not only a hazard to us--

King: The problem is that if you believe it's a hazard and you're afraid of it as I am, then you're afraid of it no matter where it's being done. And in that case you see, that, it's important, that it either be, one, the most extreme containment precautions be taken, and two, personally, I would just say don't do it. Have a moratorium. I would support the call for a moratorium, but you have to start somewhere. The Cambridge City Council, by taking a step in this direction in a sense empowers people every place else in the country to believe that they have a chance of controlling things that hitherto have been outside their control. This debate took place a little bit in the University of Michigan and many people who were very upset said what can you do, there's nothing you can do, so go ahead with the research, even if we don't want you to do the research but go ahead with the research. On the other hand, if one had on the books that the Cambridge City Council had said no, we don't think it's okay to go ahead with this research, then other people who feel very strongly are a little bit armed and encouraged--

Ackermann: Okay, let me be clear again. You're against all DNA recombinant research, all of it, I mean all kinds, P1, P2 with plants, you, personally?

King: Me personally?

Ackermann: Yes.

King: Oh yah.

Ackermann: With animals and with plants?

King: Yah, I'm a biologist. There's millions and millions and millions years of evolution from my point of view. It's about not--elephants and frogs just don't ever exchange; it's like two computer tapes cutting them up and mixing them back together again. That's not the way organisms work. They all have to have a very special set of instructions. And they can't handle having any old random set of instructions plugged in without kind of mucking up. It's tampering, as far as I'm concerned, at the most profound biological level. I hate to say here publicly 'cause my scientific colleagues, you know, are going to give me a lot of abuse. I think it's sacrilegious.

Ackermann: Thank you. I want you to understand me. I'm trying to identify what the problem is. And I'm not trying to say that because they're going to do it somewhere else, we shouldn't worry about it. That wasn't what I was saying. And Mr. Mayor, I think Mr. Mayor, it's me again,

Councilor Ackermann. I would say you were very wise to invite representatives from the State Department of Health and from, particularly from Senator's office, and it seems to me that if there is a concern, it is a concern that we should share with our Senator because some of the kind of questions that Councilor Clem was raising seems to be ought to be addressed in the Senate.

Mayor Vellucci: Councilor Duehay.

Duehay: Dr. King, are you, did I understand you to say that you were against this research in any form, any place, anywhere in the world?

King: Well, it seems to me that it's essentially irreversible. It's not like an oil spill that you can wipe up. Once the organisms and the genes get out, you can't change it. Well, that seems to me qualitatively different than things if you make an error you can go back on it. Since I fear that the proliferation of it would lead to things that it is an irreversible step. In other words, once you embark on it, if you're wrong about the hazards, essentially it's too late. I would say stop it. You should not carry it on until it is clear that it is really important because it is very, very dangerous and you cannot correct the error.

Duehay: You mean, you do not feel therefore that the potential of this research for a cure of cancer is important? You don't believe in that? Is that right?

King: It's a question of priorities; if you have a certain amount of money and a certain amount of talent that you're going to invest, when you invest it one place, you don't invest it in another.

Duehay: Are there more promising areas with regard to finding a cure for cancer than--

King: For example, preventing cancer, I would say would be a higher priority. This research doesn't lead in that direction. In preventing cancer, I don't see any biological hazards, health hazards associated with trying to cut down for example the level of carcinogens in the environment. There is always other ways to do it.

Mayor Vellucci:

Mayor Vellucci: Dr. King, you seem to be talking so that people can understand you, for that I want to thank you. Except could you tell us exactly now on another vein, what kind of infections would one get from this experiment if something comes out of this laboratory and how would it affect humans and what kind of sickness would they get and what kind of disease would they attract from this thing that may come out of this laboratory?

King: Okay, well, one, I think it would probably happen years after the initial accident had happened. In other words, some organisms would get out that had a strange combination of genes. It wouldn't make you sick. That organism would transfer its genes to some other organisms, okay? And fifteen years from now some unusual population of people, for example,

infants who had suffered some other infection and therefore had to be treated with an unusual, for example, a regime of antibiotics and therefore were an unusual health situation. Or animals, or a dairy cow herd in New Jersey. You know, it's not limited to humans. You'd get some bacteria in there that maybe wouldn't make a person real sick. It would just cut down, you know, just make him a little less healthy. You wouldn't notice it, the doctors wouldn't notice it. Years and years more would pass by. And you'd have out there in the environment a whole set of organisms which were doing little things to cut down the general health of the population. Maybe giving one set of people a urethal infection that they wouldn't have had before. Giving another set of animals an infection that they wouldn't have had. That kind of thing. If it was an epidemic, you wouldn't have to worry about it so much because then the first person that got sick, you'd say, ah huh, there's an epidemic, we should worry about it. But it's not going to be an epidemic. It will to be very subtle.

Mayor Vellucci: Causes a slow death? This is what it seems to me.

King: It's less health rather than more health.

Mayor Vellucci: Well, it could be ill health now, but the next generation after that and after that and after that it could be death, instead of sickness.

Cate: May I speak?

Mayor Vellucci: Certainly, your name and your address?

Cate: Dick Cate, C-a-t-e, Twenty-nine Caine Drive, Scituate, Mass. That's it, that's what you wanted. All right. I had to jump in when I heard something that I'm not quite too comfortable with and that is I think science to this date, my approach is more a philosophy of science. Science to this date has gone on an argument; it's taken to a school of thought which is interested in controversy. It's the nature of science for controversy and I think essentially that everybody is working for the good as someone has said here earlier tonight. Everybody, even the most hard nut scientist, that will drive forward in areas, is working for the good, he means well. And I just don't want any kind of impression set up as if, you know, I was listening to this gentleman and can agree with him to date, but when he started a little bit in the area of, you know, one generation that gets somewhat healthier than the next, and so forth. All I want to say is that controversy essentially is the nature of science. There are men in science that maybe their egos get in the way, we're not sure what, I mean, it's hard to say what happens to a man when he has to make that decision. And there's no man to blame, no one is pointing fingers at anybody, no one can be hurt by it, the thing can be solved but it's going to demand a little work. And it's going to demand we back off for a little while. Give a moratorium, and take it from there.

Mayor Vellucci: Okay, did you want to say something Mr. Vellucci?

Vellucci: Yes, Dr. Al Vellucci. 691 Cambridge Street, Cambridge, Mass.

Mayor Vellucci: East Cambridge.

Vellucci: I've got two points to make. First of all, unlike much of the, or many of the experiments which are run, or have been run at Fort Detrick, even in a P4 containment, the organisms which were used, a great deal was known about those organisms. Many, many precautions were taken with the people performing the experiments. These people were monitored as was mentioned before. Anyone who came down with any type of illness whatsoever was sent to physicians specially trained to handle that type of a problem. What we are faced with when running experiments and recombinants DNA with organisms which may result, which we don't know anything about, we don't even know where to begin to look for some of the dangers that may occur from these organisms. We know the symptoms of typhoid when you use a typhoid bug. We don't know what to look for when we use recombinant genes from higher organisms and place them into lower orgnisms resulting in a new form of life. How these people and the scientists are to be monitored, whether this thing is contained or not will not even be known because we would not know what to look for. You will not know what has escaped, it is unlike a laboratory full of rats because you can count rats. You can't count microbes. You cannot know when one has left, you do not know what dangers it possesses, where it will go or what it will do in this type of experimentation. The second point I would like to make and this is

something which perhaps has not even been touched on tonight, and which I have become more and more aware of, I have spent many, many long years at the University of Michigan in research in the sciences and that is that there is a very large segment of the population not only in this country but in countries throughout the world who do not believe in the scientific method, who do not believe in delving into the secrets of nature for whatever reason they so choose. And it upsets me greatly for the scientific community to turn around and point the finger at these people and say that these people are just purely ignorant. I think that they have just as much right to be afraid and not want to do something and not want to delve into further research in any area as all the scientists who have spent many years and much of the money that this country generates in delving into these problems.

Mayor Vellucci: Thank you, Mr. Santani, Fred Santani.

Santani: Fred Santani, 13 Eighth Street, in East Cambridge. I've heard a lot of discussion tonight concerning the NIH guidelines. I would just like to make a couple of statements that particularly go back to what Councilor Clem said. I have an article here from SCIENCE magazine, April, 1976, written by Nicholas Wade. Nicholas Wade has followed this entire recombinant DNA controversy right from the early days and he's just talking about the meeting at which people protested or voiced opposition to the guidelines that were being drawn up and you find that there is a political issue involved in the final guidelines. And if I could just

read one section from his article--"at its meeting last week NIH recombinant DNA molecule program advisory committee addressed itself not to these questions, but at Fredrickson's behest,(Dr. Fredrickson is director of NIH), to changing jobs and titles in its drafts. Fredrickson's position which in effect is to endorse the present guidelines may indeed be merited but it also happens to fall within the limits of two cogent political constraints. The first is the attitude taken by European countries towards the present guidelines. In a manuever of some finesse, European Molecular Biology Organization won itself almost a veto power over Fredrickson's decision by making known that it would only go along with it the NIH guidelines if they became no stricter. Thus, if European-American unity were to be preserved, a generally desirable objective, Fredrickson could make few substantial changes in the guidelines. As he observed at last week's meeting, without a certain measure of conformity the whole exercise would be futile." And I think what's being said there is that despite the opposition that people brought up to the guidelines as they existed, certain people wanted the guidelines to be stricter, that part of the political issue, namely, how Europe would accept these guidelines, became a governing factor in how these guidelines would eventually be drafted for our country. Now there's one other point that I don't know whether everyone here understands exactly, the function of the NIH guidelines. The National Institutes of Health is one of many groups in Washington that funds research. The National Institutes of Health came up with these guidelines. If someone

is doing work under NIH grants, if they don't follow these guidelines, they are subject to sanction by either losing funding or not being granted further funding. Now it is assumed that soon other agencies within the federal government, for instance the National Science Foundation, the Department of Defense, ERDA, and so on will follow these same regulations. But that will mean in the final analysis that if you're getting money from the federal government, you have to follow these regulations. If for instance you're a pharamaceutical house, all right, you're governed in some respects, maybe, by OSHA regulations or other safety regulations, but you're not covered by the NIH regulations. And if I today want to start in the middle of the Council chamber doing recombinant DNA experiments on this table I'm not bound by any regulations whatsoever. I think the City of Cambridge, and the Mayor, and the Council has taken the first step by which controls can be taken perhaps on a national level to keep some kind of control over this testing, not just who's giving the money besides what the control should be. I think there should be some kind of uniform control on all this type of testing as it affects everyone. Thank you.

Mayor Vellucci: Thank you. Next, will you give your name and address.

Sollini: Ernest J. Sollini, Post Office General Delivery, Post Office Square, Boston. I would like to give a personal expression of fifteen years of research conducted upon my being without my notification, that I was being used as an instrument of research, that I had been innoculated

with leukemia by a research scientist, and then had to sign a release before they would let me out after getting the injection. It brought on a stiffness in all my joints and sometimes I wondered that was due to the accident I had, broke my neck and broke my back at midline. Two weeks later I broke out in big lumps, some of them the size of a walnut. I had two just below the kneecap. I also had a growth on my ula that was three quarters of an inch long, I had pusey ears due to the break, pus running out of both ears, the left eye was partially blind, I had an intestinal block due to the pressure on the nervous system possibly and I did not know whether or not I would see the end of the year. The old scars on my body broke open and started to leak pus and I read in a medical journal that when that starts, the end isn't far off. Well, I was determined to beat it, I wasn't ready to go. I did go after discharge from the service to the Everglades in Florida. I did not have enough money to pay my rent. I went over to an island two miles from the Gulf and made myself a tree house out of two homes that were blown over in the 1960 hurricane. There I lived for seven years observing nature close at hand. And I did experience a fish kill that was spoken, by you in regards to the Charles. Of the detergents that run out into the ocean and the rivers due to torrential rain that flooded the system. The fish kill in '72 killed so many turtles, sharks, barricudas, you name it, floating belly up, the stench drove me off the island. I do know this. That I tried to get the podium on the various places throughout the country and I never could get before a mike to

express my thoughts and what has happened.

Mayor Vellucci: Just a moment. Are you opposed to this experimentation?

Sollini: Experimentation in regard to no reason whatsoever, just out of curiosity, to see what it will do to the victim.

Mayor Vellucci: Are you speaking in opposition to this experimentation?

Sollini: I am, when it comes to the point there is no reason on the research, where it's become abusive. Now I will say this, that due to the fact that I went down there and lived as close to nature as I could and observed the life of the lower animals, I come to the conclusion that they observed and have the intelligence, far superior to ours in regards to feeding together when there is food to be had.

Mayor Vellucci: Okay, thank you.

Sollini: I was somewhat surprised--

Mayor Vellucci: Okay, that's enough, that's enough. We've got enough, you've spoke.

Sollini : May I continue?

Mayor Vellucci: Just for another minute.

Sollini: Well, you know the oysters I shuckled off the mango root and the red snappers that I caught were beneficial to my being. The lumps

disappeared. And I will say I felt better there than I had for a good many months. Do you know that the growth on the throat dropped off and I attribute it to the black mango that is the principle source of food for all marine life that takes its nutrients from the salt soil that is a deterent to cancer.

A member of the audience: Castor oil

Sollini: Not cancer oil, castor oil.

A member of the audience: It works the same way as castor oil.

Mayor Vellucci: Come on, come on, let's go here. Let's go.

Sollini: Do you know, by golly, I stepped out of that island cured of what they claimed was a terminal illness.

Mayor Vellucci: Let's go. Look it. We have many more speakers, just wrap up your point and tell them you're in opposition, you got his name and address and that's it. Okay, next is Jonathan Beckwith. These are people who wrote to us and asked to be heard, they wrote a week ago.

Beckwith: I'm Jon Beckwith. I'm Professor of microbiology and molecular genetics at Harvard Medical School and a member of Science for the People.

Mayor Vellucci: And your address?

Beckwith: 8A Appleton Road, Cambridge.

Mayor Vellucci: Sit down, please.

Beckwith: First, I want to say that I work with the bacteria E.coli and over the last year or so we recognized that the techniques of recombinant DNA could actually be quite useful for the work we were doing. In fact, one of the members of the laboratory proposed that we start immediately to use these techniques to work on some of the problems that we were interested in. And our group in the laboratory met for several months, research fellows, graduate students, research assistants in the laboratories to discuss whether to proceed and our decision was not to proceed because we didn't want to contribute to this area of research and because we were very concerned about the potential hazards. And I know that our laboratory is not the only one that has made that sort of decision. And the reasons are that first of all, a lot of this is going to be repetition, but I want to state my point of view, that the bacteria strains created by recombinant DNA techniques may create health hazards. Everyone has said this, this has been suggested by everyone from most of the scientists doing the work itself to other prominent scientists to we in Science for the People. There's no debate on this statement. But what we don't know is how great the dangers are and what kinds of precautions need to be taken. So far, the national policy decisions on these two questions have been made by groups of scientists most of whom are involved in doing the research itself. This includes the group that met in California a couple of years ago and as you heard tonight around half the committee formed by the NIH were people in the field itself.

Many of these individuals have shown an unusual degree of concern for the potential dangers of this work. However, no matter how great their concern, it will always be extremely difficult for them to make objective evaluations about the dangers. Their own self interests in seeing this research move ahead as quickly as possible which comes in part from [the] competitive nature of scientists today and the requirement to publish in order to get ahead will always cloud their judgments. I have no confidence in their conclusions at all. Further, the risk of this research may well be borne by many others than those researchers including other workers in the laboratories and even members of surrounding communities or the world communities. Therefore, I propose that the process that will lead to an evaluation of the dangers of this research and of necessary safety precautions be reopened that a much broader representation of groups and individuals in the decision-making process be assured. These decisions should include input from individuals with a wide variety of scientific background first of all including people who know a lot about ecology, people who know a lot about epidemelogy, infectious diseases, bacterial diseases, etc., and representatives of the public including workers from scientific institutions who might suffer from this work, members of environmental groups and other interested members of the public. Since the process used to arrive at the decision so far which has allowed the research to continue and to spread has been a poor process and we are sure has resulted in incorrect decisions, we urge a moratorium on this research until this new decision-making process has

been satisfactorily concluded and I would imagine that this could take, it would be a matter of years, this process to be concluded. It may be that the decision, and I have no opinion on this, may be not to continue this work at all or maybe continue it under much stricter precautions. The National Institutesof Health has issued guidelines for this research which are based on this biased approach. Attempts by other groups to get the NIH to take a more reasonable approach have failed. You've heard about a public hearing, but from what I've heard about the members of that other committee that included members of the public, their recommendations were essentially not listened to. There's only one court of appeal left and that is the public. While the NIH guidelines are before us now, what is done by the Cambridge City Council can have an important effect nationwide and potentially ultimately around the world. I would urge the Council to take whatever steps are in its power to promote a moratorium on this research in Cambridge. And further, the Council should urge the NIH, its representatives, the City's representatives, and State's representatives in the United States Congress and other agencies to demand a reopening, a broadening of the decision-making process so that well-reasoned decisions can be made which meet the needs of all involved. Finally, the Council should lend its support to the development of a process locally which would involve many more people in a study of these issues. Thank you.

Mayor Vellucci: Since you live in the city of Cambridge and you are interested in this issue --I was elected to this office just a slight

twenty-two years ago, and Harvard University appointed a man by the name of Charles Witlock to be sort of an ambassador to the City of Cambridge without portfolio -- later, which is in charge of community affairs--later a man by the name of Mr. Moulton who now heads the Department of Community Affairs. In your opinion, do you think since this has been going on and has been an issue in Washington and with this Institute so forth and so on and we only learned about this six or seven days ago, do you think that it was the duty of the Director of Community Affairs at Harvard University to consult with the Mayor and the City Manager of the City of Cambridge and say, Mr. Mayor and Mr. City Manager, and City Councilors, we have an issue sort of controversial taking place in this country. We would like to talk to you about it and let you know what we are planning. Do you think that they should have done that?

Beckwith: First of all, Mayor Vellucci, I know that you have been on the City Council for twenty-two years because I wrote an essay on you when I was a high school student in Newton about twenty-two years ago. On the second question, yes, I do. I don't think that's been the practice of Harvard University in general. I think that there are a lot of benefits that could be derived from this. I think every effort is being made to make sure that it proceeds as quickly as possible. I feel, in general, there should be much more interaction with all sorts of issues, for instance on housing issues, etc., with regards to the community. But there haven't been as long as I have been around here.

Mayor Vellucci: Do you think that it is the duty of Harvard Community office or the Office of Community Affairs to have consulted with the government here at City Hall and to appraise them of all that's been going on?

Beckwith: Certainly.

Mayor Vellucci: We didn't realize until recently that this was actually a national issue taking place in many parts of this country, all the ways into Washington. Okay, thank you.

Duehay: Has a faculty of the Harvard Medical School, where this is going on, in some form or another discuss the purpose of the research at all?

Beckwith: As far as I know the faculty has never discussed this. There is also a biohazards committee established at the medical school like there is in Cambridge and it's my understanding that I'm not sure that they've met at all, but I think that's in the process of taking place there, too, and I imagine it's going to be an issue at the medical school.

Duehay: Well, I'm perfectly prepared as a member of the City Council to begin to try to understand these issues and to take them on because I think I realize their importance. I must say that I am disappointed as the former member of one of the faculties at Harvard at the failure of apparently of the faculty of medicine and the faculty of arts and sciences to debate these issues and to use their committees to inform themselves

and to inform public bodies. It seems to me that there's a real division in the scientific community, and that the faculty simply are letting the administration make the decisions without apparent discussion and debate. Have faculty meetings come to that level or what--

Beckwith: Well, first of all, I think that it has to within the institution involve even much more than just the faculty. I think again that it's a matter of self interest; all the faculty are involved in doing research, and it's not a very nice feeling to think potentially of stopping somebody else's research and I think what we've tried to do is talk more among workers in the institution about what role they can play in having an effect on this kind of research but I think in addition, the faculty should discuss it.

Duehay: Thank you.

Mayor Vellucci: After we hear from Victoria Gollsner from Neighborhood Ten, will then call on Dean Alberty, Dean Howard Hyatt, and Dean Alwin M. Pappenheimer of MIT to come forth, those three, right after she gets through and we'll just shift these around a little bit so that we can all get in, please--

Gollsner: I bring a strictly layman's point of view. I'm a citizen of Cambridge, very happy to be a citizen of Cambridge. My father happened to be chairman of the Biology Department at Amherst College and I grew up in the scientific community and learned from experience that when

there's a great division of opinion as there seems to be tonight, that it means the evidence isn't in. And I know that where there are such strong interests involved, it's only natural that people polarize into strong positions for what is going to happen or strong positions against it and I'd like to try to provide some thoughts in the middle ground. I don't think anybody seriously wants to shut Galileo up. I don't think that's the question. I think the question is more that the evidence is out; it isn't in. And we've had reassurances. We've had a great many words. What we need is a performance test. And you may laugh but what I'm going to say is that it's simply a way of opening up some options in this middle ground between the extremes, because I think it's a little bit unscientific to get too far out into the extremes. If these people are so sure that it's perfectly safe, what we might do is send them up in a space vehicle, let them do their research in orbit and if it doesn't work, shoot them and their research out into space. That's one possibility. I know it sound funny, but it's a way of opening up options. Another possibility is to let them go down to the space center, the space medicine center in Houston, Texas, and do the research and if it works out fine, I mean, they say it will work out, that there's no problem. But if it doesn't, just let them live with it for the rest of their lives and we can feed them food in through a hole. I think of course those are ridiculous kinds of options but it's simply to say there are all sorts of options that we might explore. But I do so agree with the people who said that we need more discussion and I find myself wondering if the National Association of City

Councils might not be interested in taking up this topic and broadening it onto the national level, getting more citizen involvement. I notice I'm the first ordinary citizen who's spoken all evening on this particular question. Getting more involvement and just slowing up Galileo a little bit but not telling that he's a devil. We're proud of him. I'm very proud to be a Harvard graduate but I hope that Harvard like the citizens group that I belong to will think very seriously about responsible citizenship. Thank you.

Mayor Vellucci: Dr. Alberty, Dean Alberty, Dean Howard Hyatt, and Dr. Alwin Pappenheimer, Jr., are they here, are the three of them here? If two of them are missing, we'll shut them out and put somebody else.

Alberty: I am Dean Alberty of 7--

Mayor Vellucci: Wait a minute, wait a minute, we need another customer. Have we got three customers here? Okay, we're off.

Dean Alberty: I'm Dean of the School of Science at MIT. I welcome this opportunity to describe the current situation with respect to recombinant DNA experiments. There are two areas at MIT that are relevant. One, the Center for Cancer Research and two, the Department of Biology. Let me first turn to the Center for Cancer Research. The MIT Center for Cancer Research built during 1973-74 was planned at a time before the methodology for recombinant DNA had been developed. It was built to such specifications that several of the individual laboratories could easily be made

into what we now call P3 level containment facilities, that is moderate risk facilities. The Center was planned as a facility into which to conduct cancer research involving organisms that might be potentially hazardous. It was not planned as a facility for the conduct of experiments involving recombinant DNA. No laboratory in the MIT center for cancer research has ever been used for any recombinant work. People at the Center who would perform recombinant DNA experiments are among those who [illegible] over the past two years in diverse public forums have urged the issuance of strict NIH guidelines to control various classes of recombinant DNA experiments and who in the interim have imposed upon themselves a voluntary moratorium on such experiments pending issuance of such guidelines. In terms of MIT decisions the laboratories will not be used for such work until MIT's committee on assessment of biohazards has had an opportunity to study the final guidelines just issued today in Washington. The MIT committee must be convinced that the rooms meet the P3 level containment standards set forth in the final guidelines not just those that were proposed last December. In addition MIT has other laboratory rooms which meet the standards set forth in the NIH guidelines for low risk experiments requiring P2 level containment of biohazards. These facilities also pre-date the issuance of the NIH guidelines. Some recombinant DNA experiments of the low risk class authorized in the preliminary guidelines for P2 level containment are being performed in these laboratories, specifically experiments combining genes from bacteria and organisms like yeast. The NIH has classified this group of experiments to be of low risk. MIT over its history has had a deep concern for safety. The

Institute has had an outstanding record in the handling of potentially hazardous experimentation. There are at MIT at various levels within departments, within schools and for the Institute as a whole administrative officers and committees that oversee safety and the protection against hazards, including biohazards. The environmental medical service of the MIT medical department is one of the most outstanding of its kind in the nation and over a period of thirty or more years has made important contributions of its own to the understanding and control of several health hazards associated with laboratory research and with hazardous occupations. The Safety Office of the MIT department of Physical Plant is likewise highly qualified. More recently we have formed and put into operation an Institute-wide faculty committee on assessment of biohazards. MIT experiments in the recombining of DNA molecules of whatever class of hazards are subjected to the checks and balances imposed by this multilayer system. Moreover, MIT welcomes the issuance of the guidelines published earlier today in Washington to govern recombinant DNA experimentation and prepare to observe both the spirit and the letter of these guidelines without reservation. Many of the scientific leaders at MIT were among those who originally urged such guidelines. When proposed guidelines were made published last December, several officers and committees of the institute concerned with safety used them to be certain that experiments then underway were in conformance with what was being proposed to safeguard the public. Now that the final guidelines have been issued, the same will happen with them. The City of Cambridge has a duty

to be certain that when scientific experiments are undertaken in this community, the health and well-being of the general public as well as the workers involved are protected with all reasonable care. MIT has always cooperated with the state and public health agencies. Should the City of Cambridge decide it must institute an independent system of checks and balances and guidelines to insure public safety in the matter of recombinant DNA, please be assured that MIT people stand ready to cooperate in any way they are able. For example, if the City of Cambridge should elect to establish a joint mechanism with research institutions within the city for continuing assessment of the facilities and experiments both in universities where research might be done and in industries where commercial processes might be developed, MIT people would be happy to lend their talents and expertise to making this joint effort effective and successful.

Mayor Vellucci: Thank you. Any questions of any councilors?

Ackermann: Yes, I'd just like to say that you do not now have any representatives of the City of Cambridge on either of the two committees that you spoke of, is that right?

Alberty: I believe it's right that there are no members outside of the MIT community on the committee.

Ackermann: But you are willing to accept such a proposal?

Alberty: That can certainly be discussed.

Mayor Vellucci: Next.

Baltimore: I am not Dean Pappenheimer.

Mayor Vellucci: Who are you?

Baltimore: I am David Baltimore.

Mayor Vellucci: David Baltimore, you are where on the list--David Baltimore, American Cancer Society, Professor of Microbiology, MIT, and Nobel Laureate in Medicine and Biology.

Baltimore: That's right.

Mayor Vellucci: That's you.

Baltimore: That's me. I live at 28--

Mayor Vellucci: Just a minute, wait a minute now, just one minute, Doctor. Councillor Graham.

Graham: Are we finished with the opposition? I mean we are finished with the in favor and are now doing the opposition. His name appears on the in favor list.

Mayor Vellucci: Right and that's what I'm going to do. When these three are finished--

Graham: Are we going back again?

Mayor Vellucci: --I'm going to put three of the opposition on. Because there is a whole long list of them here, but please believe me, we'll be here until five or six o'clock in the morning so the fairest thing to do now is to take three and then three more and then three more until we finish up tonight. All right. Dr. Baltimore.

Baltimore: Thank you Mayor Vellucci. I live at 28 Darnell Street in Cambridge.

Mayor Vellucci: Do you vote Cambridge?

Baltimore: Pardon?

Mayor Vellucci: I said carry on.

Baltimore: I am here as a professor at MIT but not a spokesman for MIT. I was on the committee that called the original moratorium on recombinant DNA research and had been involved in the organization of the Asilomar meeting that led to the first round of guidelines, but have not been involved further in the development of guidelines. I would like to speak to the potential benefits that I feel can come from recombinant DNA research work. I think those benefits have been widely discussed and I won't dwell on the many obvious possibilities such as the synthesis of biologically active molecules. I would rather emphasize the problem that I am personally involved with and that I have seen developed in the last few years.

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The main line of defense of our bodies against attacks by bacteria, by viruses, by fungi is a system known as the immunity system. An immune system in people is a system that has diseases of its own and in many cases has limitations that we don't understand. There are infections that the body cannot cope with and there are specifically cases of cancers that should be attackable by the immune system, but for one reason or another are immune to it. To strengthen this main line of defense, the natural line of defense of our body, we need to know its basic properties. And I was recently at a meeting in which many of the world's experts on the immune system got together to try to decide what was known about the immune system and how it works. And what they decided was that the basic questions about how the immune system works are not understood today. The hope was widely expressed by many people at that meeting, many people who themselves would not consider doing recombinant DNA work because it's very far from their own expertise that it would be recombinant DNA technology that would provide the breakthroughs that would teach us how the immune system works and allow us to manipulate the immune system in our favor when it's not ordinarily in our favor. The impasse of understanding the immune system has lasted at least twenty years, without a major change. And it is the belief of a large segment of the scientific community that recombinant DNA can make that change. I think that learning how the system works should have the highest priority. So that we can help it be strong and turn it to dealing with such diseases as cancer which has so far eluded the system. If the Cambridge City Council is concerned with the

health needs of its citizens, I think it should be encouraging that Harvard and MIT use recombinant DNA technology to its fullest consistent, of course, with whatever potential hazards are realized. The best people to do this kind of work exist in your universities. The density of population in Cambridge I do not believe is relevant because as many people have said if there is a hazard the hazard will be as serious any place as it will be here. I think we have to face the question of hazard, I feel we have faced it in the NIH guidelines and that those guidelines are as good for a population density of Cambridge as they are for a population density that is much lower. I think that the NIH guidelines provided for the safety we need; there are two tier systems and there is one tier that is not being emphasized sufficiently here. That is what has been called biological containment, the specific manufacture of microorganisms that can only live in the laboratory. And so when some of the speakers up here have said that these things are going to get out in the population, they are going to cause disease, there has been an enormous effort and will be a continuing effort to make sure that those organisms when they do get out of the laboratory [.....] because there is no doubt that they will be able to, cannot grow in any natural circumstance, they cannot grow in you, they cannot grow in me, they cannot in fact grow anywhere because they have been genetically enfeebled to the extent that they are only able to grow in a situation that we have to define for them. That is the first level of containment. The second level of containment is physical containment which is what we've heard most discussion about. It merely adds a level

of protection. A level of protection which to a certain extent is unnecessary. But which will certainly make people aware of the fact that they're dealing with an unusual form of biological research and will act as another factor, ten or a hundred or a thousand safety over the biological containment which as I say is already probably sufficient for any P3 level experiments that we would consider. Both of these together provide an enormous barrier of safety. Even if you judge the specific Harvard facility does not match the P3 containment criteria established by NIH, I hope you will encourage Harvard and MIT to continue to use recombinant DNA technology following the safety guidelines so carefully prepared by NIH because recombinant DNA is able to provide the foundations for dealing with a wide range of human problems that have so far eluded science. Thank you.

Mayor Vellucci: Thank you. Dr. Baltimore--

Baltimore: Yes, sir.

Mayor Vellucci: After all the evidence is in on both sides in the City of Cambridge, to its people of Cambridge, to its city government, that is the people who live within the six-mile limit of the City of Cambridge, if the citizens of this here City of Cambridge decide that they do not want this laboratory in the City of Cambridge, you're a doctor, do you think that the MIT and Harvard team combined should bow down to the wishes of the people of this city?

Baltimore: Well, I have no idea, I have no doubt, that Harvard and MIT

faculty would go along with whatever the laws were of the City of Cambridge.

Mayor Vellucci: Are you talking about the laws or the wishes of the people of the City of Cambridge because you may be forcing us to enact emergency and immediate laws.

Baltimore: Okay, let me put it a different way. I think that the Harvard and MIT faculty will certainly go along with the wishes of the City of Cambridge.

Mayor Vellucci: Thank you.

Baltimore: There is no one on the faculty that would wish to go against the wishes of the city.

Mayor Vellucci: Thank you very much. I am talking about the wishes of the people.

Baltimore: As a member of the City of Cambridge, as a resident of the City of Cambridge, and as are many other people here, I think you will find there is a wide divergence of opinion and I would be very happy for instance to see a wide public discussion not by the local faculty members, but by the local people of Cambridge, who I think have a great interest in having their own health improved.

Mayor Vellucci: Improved--

Baltimore: Improved.

Mayor Vellucci: Not destroyed, but improved.

Baltimore: Right, I agree with you.

Clem: I am intrigued by your excellent definition of the phenomenon called biological containment. I am confused, however, in terms in view of some other information that has been given tonight; I can understand how you can develop an enfeebled strain if you know what it's characteristics are. But is that not a fundamental contradiction with your inability to predict what will happen when you take one plasmid from a higher order and put it into a lower organism. I mean if you knew what, it had an ability to predict what would happen and to mandate its characteristics, to understand its characteristics, it doesn't seem to me that that's what you're trying to get at. It's the fact that you don't understand enough about it that urges you on to see what would take place and how can you know that you're producing an enfeebled strain?

Baltimore: Councilor, when we produce an enfeebled strain that strain has a series of defects in it. The possibility that those defects would be corrected by an inserted DNA from for instance a frog or a fly, so that that strain could now grow, is effectively zero. The reasons being that there are multiple changes and so you would have to have multiple inserts of functional elements in order to get the bacertium to change back into a completely healthy bacteria. That won't happen effectively because of the nature of the mutations that are being used. I don't want to get too

technical. But they require that the organisms grow on chemicals that we have to provide it and then throw the excess down the sewer. They don't hurt anybody but they allow the bacterium to grow. The bacterium won't grow at except when that's provided. There are a series of such chemicals that the bacteria may depend on and there then are series of other mutations that are put into it. There is another level of containment which had to do with the containment on viruses that can be used to carry genes around, which similarly can be confined very precisely to what they will grow on. And so I feel that that's not a hazard.

Clem: And you feel, obviously you felt--

Baltimore: It was just pointed out to me by Dr. Singer that the guidelines also require that when you make a new strain you check to make sure that those mutations are still there. So that if not what--even if something should happen, you will be aware of it by the nature of the work that you are doing and effectively autoclave the strain immediately.

Clem: And it's your belief that obviously you are aware of the concern because you participated in a voluntary moratorium, you took some personal initiative in trying to have a set or series of guidelines developed notwithstanding the fact that there's been some very persuasive evidence and arguments submitted tonight that that holds true for projects funded by the NIH but not necessarily true for projects funded from other sources, although it is the hope that that standard will be adopted by no means certain that that will take place. And you feel that this first

round of developing guidelines has been comprehensive enough to protect the public's interest?

Baltimore: Councilor, it's hardly a first round. The guideline developed started with the first thinking about the problem which was at a meeting, held in fact at MIT, in April of 1973 -4; I lose track of years. Since that time a very large segment of the scientific community and then later of the general community of interested people have been thinking about this problem. All of that input has gone into a series of drafts, drafts first of all at the Asilomar meeting, and then later made by the NIH committee gone public, looked over by the public, gone back to the committee, strengthened in various places, sent to Dr. Frederickson. An open hearing was held about those. He then changed the guidelines in light of what he heard about the open meeting, hearing, and they ultimately represent a balancing between very strong forces. The very strong forces you heard here. The forces that say the work is too dangerous to go on. The forces that say there's really no hazard. Dr. Fredrickson, and he may not be the best person in the world to do it but I find it hard to imagine anybody better, he took a line that he felt provided a necessary safety and at the same time allowed at least the beginnings of the use of recombinant DNA for the benefits it has inherent in it.

Clem: And you believe the scientific community is equipped with the expertise to police itself?

Baltimore: I think it is and I think that the biologically contained organisms will provide that level of safety almost independent of how

badly they're treated. I think with a minimal degree of care that the mutations remain solid in bacteria and that is a mandate and will certainly be looked over very carefully by the Review Committee that those strains are quite safe. I would also say in response to your first question that the various other agencies that fund biological research to my knowledge will go along with the NIH guidelines and I would expect within weeks that each of them will, as soon as their boards meet, officially adopt those guidelines for work under their funding auspices. The--at least one industry that I'm aware of is prepared to accept the guidelines and it would surprise me enormously if all industrial organizations carrying out recombinant DNA research did not also accede to the guidelines. If that does not happen, I think you will see an explosion within the scientific community against organizations that are going to try and write their own guidelines unless, of course, they are more severe than the NIH guidelines.

Mayor Vellucci: We have some letters here, Doctor--the three doctors, one from the Worcester Foundation for Experimental Biology. "The latest brand of genetic engineering is the most potentially dangerous research in the history--

Duehey: Mr. Chairman--

Mayor Vellucci: I just wanted to let them know. These are letters--

Duehey: Those letters are sufficiently important that I think the City Clerk at the appropriate time should read them clearly into the record.

Mayor Vellucci: Not only in the record, but for people to hear. I think the people are interested in hearing who wrote to us in opposition. There is a very important letter that just came in today. We'll probably read the rest of them later. The College of Physicians and Surgeons at Columbia University. You've heard of them, Doctor? "Cambridge City Council. Gentlemen: In connection with your deliberations about the construction of a recombinant DNA laboratory at Harvard University, I urge you to read the letter I published in SCIENCE of June 4th. I understand that a copy of my article has been submitted to you. I consider this issue as so important that I take the liberty of repeating my serious warning against engaging in this kind of experimentation. Erwin Chargaff, Ph.D., D.S.C., H.C., Professor Emeritus of Biochemistry of the College of Physicians and Surgeons of Columbia University." That is only one of a whole mess of them that we have here, all in opposition. Just thought you'd want to know--do you know that?

Baltimore: I know Dr. Chargaff.

Mayor Vellucci: Do you respect him?

Baltimore: Well--

Mayor Vellucci: Well what, you don't respect him?

Baltimore: I don't respect him for his opinions in this particular matter.

Mayor Vellucci: But do you respect him?

Baltimore: Yes.

Mayor Vellucci: As a person? A reputable person?

Baltimore: Oh yes.

Mayor Vellucci: With great knowledge. The only thing is that you disagree with him, is that it?

Baltimore: Well, we disagree.

Mayor Vellucci: I'm afraid of you. Carry on.

Pappenheimer: My name is A.M. Pappenheimer. I live at 11 Willard Street, Cambridge. I'm a Professor of Biology at Harvard, and Mr. Mayor you were kind enough to read a lot of qualifications that I had on the Commission for Immunization Armed Forces Epidemiological Board for about twenty years and I'm a consultant at this Fort Detrick facility that was mentioned and my main interest for the last thirty or forty years has been in how it is that things as small as bacteria and viruses are able to cause disease in animals so large as man. What I'd like to tell you is a few reasons why I believe that a containment facility such as that proposed should be built in the biological laboratories at Harvard. Even though work with organisms capable of causing human disease, at least as far as anyone knows, are not contemplated either now or in the future. It's my feeling that work with known disease-causing organisms is more suited to medical schools and medical research institutions. Even so it's worth mentioning that most ordinary pathogenic bacteria have been worked on for the last century

without containment facilities, such as our proposed;and at the medical schools that I have been associated with and taught at over the past twenty-five years all the students were given pathogenic organisms to work with in the class room and nevertheless that is organisms capable of causing human diseases. Nevertheless, accidental infection due to faulty technique have been very, very rare among medical students and the risk to the student of working with such organisms is certainly far less than a picking up of an infection while riding a crowded bus or a subway or sitting perhaps at a crowded City Council hearing. Then why have a facility at all if one is not going to work with pathogenic organisms anyway. Well, one reason that I think hasn't been mentioned here but it's a very important reason from the researcher's point of view, that is the original reason the containment facility was proposed at Harvard was because working with mammalian cells and cell cultures they become contaminated very easily from the outside so that originally much of the reason we were going to have this facility and one of the reasons I signed the original application grant was because we wanted to protect the cell cultures from contamination from the outside. Now, this business of preventing them from escaping is something a little bit new perhaps. Now what is the purpose of working with recombinant DNA? One reason why so many young biologists here and everywhere else throughout the world are already working in this field or planning to work in this field is because they see a hope for answering many fundamental biological questions which until this time seemed beyond our capability of answering, beyond our

technical capability. We all know that an organism begins life as a single undifferentiated cell. What determines whether the progeny of that cell will become a blood cell or a brain cell or a muscle cell or perhaps even turn into a cancer cell? The genes are there from the very beginning and how are they turned on and off? Obviously if we can obtain multiplication of a gene, an individual gene in a laboratory test tube, we can more easily understand its control. What is the danger if we put a fruit fly gene or a frog gene into E. coli that it will turn into some kind of pathogenic monster? I see no way to estimate the likelihood that such a bizarre accident might take place. I don't want to sound flip or irreverant, but my own particular feeling and guess is that the risk is very much less than eating a washed radish or a raw carrot or a piece of lettuce from your garden or even drinking a glass of water from the well. Any one of those will feed you thousands of E. coli. Now those responsible for the virtual wiping out of infectious disease from our society from Louis Pasteur on to the present day were not afraid to work with viruses and bacteria isolated from diseased patients. If they had been deterred from this work by the fear of hypothetical unknown risks above and beyond the known ones, we would not have penicillin today or any of the other benefits regarded by medical research over the past century. And I must just simply mention that the plasmids that Dr. Jonathan King spoke about, that the plasmids that he spoke about carry resistance to many broad spectrum antibiotics, were only discovered and only came about because we had antibiotics. If the research on antibiotics which have protected so

many people hadn't been done, we wouldn't ever have known about these plasmids. Now in closing, I would like to read you a message from Dr. John Enders who received the Nobel prize a few years ago for his pioneering work on poliomyolitis virus that causes infantile paralysis. It's only because of this work that it was possible to develop the vaccine that has removed the threat of this disease from our society. Dr. Enders cannot be here tonight because he's out of the country. But he wished me to give you this message. Dr. Enders does not believe that it's possible to prevent work on mammalian cell culture or mammalian cell viruses or recombinant DNA from going on. The work that Dr. Enders did I might say on mammalian cell culture and mammalian viruses is what led to the elimination of polio. He feels that people such as Professor Paul Berg and Dr. David Baltimore and this committee that acted in an extremely responsible manner towards the public in setting up guidelines for this sort of work. In Dr. Enders' opinion research now being carried out under the restrictions being laid down is perfectly safe. He believes it would be very unfortunate indeed to tie the hands of young researchers who may make discoveries beneficial to society by needlessly stringent regulations. Finally, I might add and then I'm through that he also pointed out that most of his own work on pathogens of known virulance was done in laboratories that lacked containment facilities even such as P3. They didn't exist.

Mayor Vellucci: I understand that Dr. Hyatt came back. Is that you Dr. Hyatt?

Hyatt: I am here Mr. Mayor.

I thank you and members of the council for the opportunity to say a few words, particularly at this hour. I would like to concentrate on three points. I am the Dean of the School of Public Health at Harvard. Before going to the School of Public Health my career was spent at the Medical School. I am a physician; I was in charge of the Department of Medicine at Beth Israel Hospital and in charge of the Cancer Research Laboratory before I moved four years ago to the School of Public Health. The points that I would like to emphasize are the following. First, it's difficult for me to recall any major advance in medicine or public health that has been made at any time that has not involved some risk. Dr. Pappenheimer just referred to Enders' work on polio,vaccination against small pox, the tuberculosis control program, you can name them one after another, each involved a risk, many risks at times, and it was a question of honest people attempting to assess benefits on one hand against risks on the other. And surely, as recently as the trial against polio there were perfectly respected and respectably investigators/scientists who said don't do this, there's too great a risk and those views had to be listened to as a matter of weighing what might have been gained against what might have been lost in coming up with the answer. On occasion the answer is that the risks are too great if the benefits cannot be enough to merit the risks and as a result many of the experiments that are proposed are just not carried out. Secondly, I should stress that we are

only a very short distance down a long, long road toward controlling most of the medical and public health problems that confront society today. We've heard about the triumphs in antibiotics and in vaccines, but the bulk of conditions that afflict our people are conditions about which we can do very little. Cancer, heart disease and a whole gamut of other conditions. And it's not a matter of assembling information that's there that requires putting together in order for us to get the right treatment or the right preventive measures. It's really acquiring the basic information. And we in the medical area and in public health depend on the kind of people that you listened to tonight and on the people in the biology department and the biochemistry department and the Institutes of Health who bring forward the basic information that ultimately will lead to disease control. It is that that it seems to me is so important that you have to weigh against the risks involved the kind of information that might emerge. One of the most important developments in the field that's of principal interest to me at the present time, that is preventing cancer, one of the most important developments in my lifetime is the development of the test by a molecular biologist at the University of California named Bruce Ames. He was doing work that was very similar to some of the work that you heard tonight involving DNA. We could never have had the test that is now universal, almost universally used for detecting those substances in the environment that are likely causes of cancer, if it had not been for the work of Ames, called the so-called Ames Test, now widespread in this country and throughout the world. And the third point I would like to

make is one that Councilor Graham and Councilor Ackermann made and several other people referred to and that is ultimately the decision to be made, I believe, is not a scientific or a medical decision. It's a decision to be made by society. It's the function of the scientists to present as fairly as they can to you, the pluses and the minuses. It's the function of the physicians and the public health experts to present to you as fairly as they can the needs that they see in society, the way in which these needs might be filled by the work that's underway. And then I think it's the function of all of us, not as physicians, not as scientists, not as lawyers or as philosophers or clergymen, but as members of this society and you people as the elected representatives of this society to make the judgment. You know from my remarks I hope your judgment will be that this work is important, that this work should be promoted. It's my view that it should be.

Mayor Vellucci: Are you on some kind of a team at Harvard there that's working on this thing?

Hyatt: I have relationships with people you've seen tonight.

Mayor Vellucci: Well, how is it I talked to a professor--who is the professor I talked with Sunday, he called Sunday at noontime when he called me? You. I said to you if you didn't show up here I was going to use for the first time the powers of the Mayor and I was going to subpoena you in here, and I was going to send the Sheriff down to pick you up and

bring you into this Council. And you assured me that you would come. Now why does it have to come to this? You say that the decision is up to the people and the city government should be talking about it and so forth but how come this whole team never came into the City Council and this has been going on for many months? And we were forced to call this meeting and invite you in with the threat that if you didn't accept the invitation we would send the sheriff down to pick up your bodies and bring you before the City Council. Why does it have to come to this point?

Hyatt: May I comment, Mr. Mayor. This is something--

Mayor Vellucci: Please comment.

Hyatt: Obviously I am not in a position to answer the question you just posed.

Mayor Vellucci: Do you live in Cambridge?

Hyatt: No, sir, I live in Brookline.

Mayor Vellucci: Well then, if it happened in Brookline, well, how would you feel?

Hyatt: If it happened in Brookline, I would be sympathetic with the position you've taken.

Mayor Vellucci: Well, make believe you live in Cambridge. Are you sympathetic to what I'm saying?

Hyatt: I agree to the extent that I think we in the medical community, we in the scientific community have been very remiss in not sharing responsibility and not bringing these problems out into the open. I think Dr. Singer referred to this earlier. I think that Senator Kennedy has made a strong plea for much wider decision-making. I'm completely in sympathy with that. I would just urge you, Mr. Mayor, in your examining what has happened in the past and in finding fault, and I think properly finding fault with some of the things that have happened in the past-- not taking a step that will lead to disadvantages for us and our children.

Duehay: Mr. Mayor--

Mayor Vellucci: Yes, Councilor Duehey?

Duehey: I just like to-- speaking on that issue, I have spoken in the last eight or ten days since this issue has come up with a fairly large number of people from all walks of life. I think the problem of this lack of communication in the past has put the City Council in an impossible position. My conversations are running thirty-to-one against, I think possibly because we have not had any dialogue at all, very few people understand what the issues are, and perhaps when they do understand them, they will not have this division of opinion. But there is great, great misunderstanding at least among the public and this is in all walks of life. I've spoken to many people in several universities, I've only spoken to one person so far in my discussions with people at Harvard and at Tufts where I work who think that there's any responsibility to go along with this.

So what in a sense this early failure of dialogue has created is an inevitable delay. I don't see how in the face of the overwhelming number of opinions I'm getting and discussions from people who are on edges of this field, not perhaps so far into it as those doing the immediate research, that we can go forward with this until we have had this public dialogue which in effect is just beginning tonight.

Hyatt: I think that there's one problem, Councilor, that I see. And that is that for whatever reason there is an expectation on the part of many people, perhaps most people, that there is an answer to these questions. I don't think there is. I mean there is this question you have been delving into all evening as to what is the risk. It's a matter of opinion. One weighs the views of a large number of experts. I believe the risks are relatively small. On the other side of the equation is, what are the potential benefits? I think those are likely to be very large. But again that just is speculation.

Duehey: But I think when we talk in terms of an environmental impact statement--

Hyatt: I understand. But I think that people do expect that somehow, somewhere, we are going to find the truth.

Duehey: No, I think people are really more reasonable than that. I think that most people have a capacity to weigh the risks and the consequences

and really kind of understand that. I just think that it takes some time for these matters to be developed. As I gather it, the faculties themselves have not discussed these issues in open faculty, although there has been a great deal of committee work. Then I believe the universities' community has some obligations that they have not taken seriously enough at this step, and they certainly have not debated these issues in the outside community. That is what we are going to be doing, I am afraid, over the next several months.

Hyatt: I think that leads then to the question of where you draw the line. I agree there are certain kinds of experiments that, as I said at the outset, are so fraught with risk that you would just say they are not appropriate to be done or they ought to be delayed until there's been a great deal of dialogue. At the other end of the spectrum, what we refer to, or what we describe as P1 experiments, and I think that very few people would say that on the basis of our experience that it's appropriate to stop those. The question is where you draw the line. My own view is a very strong one but there is enough in the way of evidence suggesting the risks with the so-called P3 category that are sufficiently small to potential benefits to medical research, to our approach to a variety of diseases, sufficiently great that it would be very destructive to stop this at this time.

Ackermann: Mr. Chairman? I was a little bit disappointed in what you said. For one thing it seems to me that there are concerns about this

kind of work being done and in a college setting, as opposed to other settings which I expect you to address yourself to. The other thing I want to say is that I think people in public health have to worry about what you can't expect young scientists to worry about which is that the young scientist rushing to find the next truth. It's the scientists that believes in truth, not the lay person. The lay person thinks they are all crazy. It's the young scientist rushing to find the next truth who is not thinking about, sufficiently, about the possible results and I would like to mention them and these great benefits that have been conferred upon mankind lately by brilliant young people. I'd like to mention Thalidomide. I'd like to mention the birth control pill which certainly came to us too early and without sufficient thought and I think I'd even like to mention, though maybe I don't know enough about it to say, but the antibiotics because I understand there is grave concern that some of -- the antibiotics may cause graver dangers and greater problems and new problems that hadn't been thought of before. And I think it's obvious to say slow down. And I think that's a public health business.

Hyatt: I didn't mean to imply, Councilor Ackermann, that this tendency to think in terms of a kind of all or none approach to these problems was limited to any single group. I agree with you. I don't think there's anything we do in medicine at the present time that doesn't--even among the so-called proven approaches, that doesn't carry with it risk, and that risk varies, a great deal. I think that we in medicine have been often very guilty of paying too little attention to risk and moving too fast. I think

the Thalidomide story is a good example of our having permitted the dissemination of a compound that should have been restricted and tested very much more carefully before it disseminated. Happily, in this country it was not distributed but that was just by chance and the chance of one alert woman working in the Food and Drug Administration.

Graham: I would like to hear more in opposition. You said three in favor and three against. That's the fourth one in favor. There have been more in favor than in opposition. I'd like to hear more in opposition.

Mayor Vellucci: Herbert E. Galeforth, Hallworthy Street, Cambridge.

Galeforth: I would like to speak in opposition to the colleges in their try to advance themselves at the expense of the innocent. Now I would like to make a statement. I call myself a layman basic material and causation and effect scientist. I do not own any high school diploma. I do not own any college diploma so therefore all my work for the last fifty years has been in practical material results. And when we didn't know something, we admitted it. We didn't call it a phenomenon. Also we have gone to such extremes as to find the would-be legitimate basic of all fields of knowledge. Now in order to do that, you first must understand what your five natural senses can tell you, if you have all the five natural senses. Of course, I would never be able to explain how blue the sky is to a person who has been blind since birth. No matter how hard I could try. I don't think anybody else would be able to do it either. So therefore, as

basics we deal only in basics. What we know, we know. What we don't know, give us ten minutes, we'll try to find out about it. But we don't push ourselves down other people's throats with so-called knowledge because you see knowledge is built on results. Material results. Now there's been a lot of research going on in this world for a long, long time. Now the ancient philosophers and the men that did the work, the laymen so-called, like way back, Leonardo DiVinci, he performed material results. Therefore, he was a pure scientist. Then along came Michaelangelo and his work, his work--he performed--he was a pure scientist in his field. Then we came along to Copernicus, all the work that that man did, straightening out all the previous inequities and everything else involved. But now they go by proofs, material proofs, because at the time the sun was supposed to go around the earth--and now it's the basis of our astronomy. Though we still do not know the basis of cause and effect, but there has to be material. Nobody is born into this world with previous knowledge. You have to start from scratch. Everybody does until it is your ability to see what you're born into. In other words, I call it the creation and the stars and the moon the creation, and as it was previously before you and I arrived there. But we've done a good job in botching it up.

The whole field of medicine is built on antibiotics. Has everybody forgotten the ability of the human anatomy to heal itself? When are you going to start realizing that? It's about time you people woke up and realized that you have to fit yourself to the environment. They'll never

make the environment. All they'll do is to disrupt it. And you are subject to it at all times whether you like it or you don't like it, and you abuse it and you pay for it. You have diseases set in. We think we know more than the creator knows.

So, in the process of things, science has a lot to learn. They have no basis but they claim they do have. You see, it was the laymen inventors that did everything for this world, Thomas Edison, Benjamin Franklin--all the men that never went to school. Isn't that funny? Not one of them had a school diploma or a college diploma, but they had the ability to invent. I go to General Electric and I ask the same question over and over again. "What is electricity?" They get mad at me for asking that question. They say that nobody knows. That they don't know, that nobody has the right to know. I'm an old Yankee and I'm proud of it. And I got good training by a real genius. An old Yankee uncle. He taught me to respect the rights of everybody and not to let anybody crawl up my back while doing it. I believe everybody has just as much right to live as I have. But when I'm deliberately stopped from doing what I can to make a name for myself and leave it to history, I object to it very strenuously. And I found out all these years, these fifty years, that I've been working, I am much ashamed to say that I have been stopped by the so-called monopoly of the educational world. They can't do anything and they fouled it up.

Now I am here tonight as a citizen of the City of Cambridge. I have been here for twenty-five years, originally from Medford. I would like to

ask the ordinary public as well as the other men who are here in educational fields, and I do respect their trying hard. Why have I been stopped from giving things to the world? Now, we have both cases on this set-up on genetics. If you're going to deal with genetics you first must find what a gene is. The people haven't reached that point yet. They had electronic microscopes to work with when electronic microscopes were in their infancy coming in here, inspecting the box which had some of the first ones.

Mayor Vellucci: Tell us why you are opposed to this facility.

Galeforth: Because there is no guarantee that the ordinary public, which you are responsible to, that nothing's going to happen. It's as simple as all that. Now in my own discourse--

Mayor Vellucci: Now look at it, we have a lot of people who want to talk here.

Galeforth: I understand that.

Mayor Vellucci: There are about forty people after you.

Galeforth: I found out that they're subduing me. If I can predict earthquakes six months in advance in the Boston newspapers, why have I been subdued? And the accreditation never given--they can't even do what I'm doing and here they are telling me that, the people that control the accreditation, that you've got no right to it. When all the justice they think they

have, they don't derive from their inventors--I ask that question. I've had my say. Thank you very much.

Mayor Vellucci: Thank you very much. Next?

Chorover: Mayor Vellucci, my name is Steven Chorover. I am on your list although you haven't recognized me to speak.

Mayor Vellucci: What is your name?

Chorover: Steven Chorover. I live at 262 Clinton Road in Brookline. I work, however, in Cambridge. I am Professor of Physiological Psychology at MIT. For several years I have been concerned both as a scientist and as a citizen with relationships between biological technology in public policy and I have become increasingly concerned with problems of public scientific education.

I'd like to begin by saying that although the Councilors have expressed some hesitation about getting involved in the scientific issues of recombinant DNA, as a non-expert in that field, I'd like to say that I think they have mastered the essentials of it and from all the comments I have heard they are exceedingly well informed. And one of the problems is that they should not be put off. In many sense by the pretense, and it is a pretense, that one must have a special amount of expertise in order to understand what the essential issues are.

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It is very late; I'll try to be extremely brief and dwell on a few points that I think have not been stressed sufficiently by other people. I had a number of comments on the point of the competition between special interests, other times by political interests, and sometimes by scientific interests which tend to cloud discussions such as this, especially when those people who purport to speak for science can lay claim on the one hand to the scientific neutrality which supposedly informs their work, and on the other hand, to alleged benefits which will flow from it. We have had considerable discussion this evening, again well informed, about the ambivalence of science in this respect. Science promises a great deal; it's supported for the promises it makes. It often fails to fulfill them and often it delivers things that no one imagined it would ever deliver, things that remain to haunt them.

I think that we are here dealing with an issue that is very different in one important respect with the nuclear energy issue. We are dealing with an issue at the beginning or very near the beginning and perhaps we could bring to bear on that issue some of the lessons we have learned painfully from past mistakes, with respect to communities and people as a whole to take control of the things that are done in their name and with their support and implicitly with their support because of the funding that they supply. I think it's worth saying that the response of the molecular biologists, the recognition that they might have been playing with something that has potential danger is something that everyone ought to applaud. But having recognized that there are certain

dangers implicit in what they are purporting to do, the discussion immediately turned to technical details of how to bring that problem under control, technically. How to contain them. How to put them in a box in which to do recombinant E. coli experiments are going to be done. It is my opinion not as an expert, but as someone who has read the material that is publicly available that the issue is not one primarily of containment, but at some point this Council and any group of people who want to deal with this issue directly should begin to look beyond the technical questions involved to recognize that we do not know, no one knows, what the outcome of these experiments may be. It is possible to conjure forever with scenarios that promise on the one hand solutions to every conceivable problem, or threaten on the other hand, inevitable disaster. I don't know what to predict. I don't believe that anyone who works with these organisms and their possible pathogen derivatives can say with certainty anything about them. What we have to confront, however, it seems to me, and this provides an excellent opportunity for Cambridge to take the leadership in confronting it, is the question of whether science and scientists should be responsive to the community in which they live and earn their living.

If this work is to be done, and I am not at all convinced that an extensive reflection on that question would lead people to feel that it ought to be done, but if it's to be done, the question arises whether it should be done in a city such as this one. And if it's to be done in a

city such as this one, the further question arises as to what precautions ought to be taken.

I said I wasn't going to say anything technical but no one has mentioned tonight that although a P3 facility has been described as a moderate containment facility, it is nothing of the kind. It is the minimum physical containment facility in the NIH guidelines. P1 is an open laboratory, P2 is an open laboratory with signs; the only point where physical containment enters into the picture is at P3. So describe P3 as a moderate containment facility is to ignore the fact that in the guidelines it is the minimum containment facility. It seems to me, however, that the issues of a technical kind that should be covered up to a very large extent have been covered. We need hearings, discussions, we need people who are in government to the point of understanding the issues where they no longer apologize for not understanding them. We need scientists to talk to the people to whom they are ultimately responsible in language that those people understand. And we need those people who have the courage and interrupt and stop people when they start talking about things they do not understand. I have had enough experiences with these kinds of issues to know that if the issue cannot be made intelligible to everybody, then somebody--there is no issue here that cannot be made sufficiently clear so that everybody can understand it, so that they can then attempt to draw their own conclusions. It seems to me, though, a final point that there are other problems to be dealt with.

These problems are not of a technical nature. Problems involving evolution, the atmosphere we live in, ethics, social priorities, problems of health care, all of which are involved in the promises that are being laid out for the kind of research that is being proposed here. And questions of possible alternatives to those kinds of research.

I think it was absolutely fitting that the Cambridge High School group came in here when they did and sang the song that they sang. This Land Is Your Land, it's our Land. And what is done with it, especially in our name, is something that we ought to take very--pay very, very close attention to. And not depend upon people who are very far away to do that kind of thing for us.

The development and employment of genetic technology, without public participation, in my opinion is an exercise in irresponsibility. It is very late at night. At the risk of stating something that is better left unstated, let me borrow a bicentennial phrase and make the suggestion that recombination without representation is a kind of tyranny.

Mayor Vellucci: Thank you very much. Next?

Corin: I'l like to talk because I'm going to miss the last bus back to Arlington and some of us don't have cars and we have to take the bus. My name is Leslie Corin and I work for a governmental planning agency. We consumers do not have the power of Harvard University. But we do have brains and we do have laws. And we must demand on the basis of existing

laws, the right to participate in all planning for any health research. It is after all our health that the scientists seek to improve. It is therefore our right to decide the future of our health care and not leave it up to the scientists, the educators and the bureaucrats.

To be specific, certain kinds of health research funded through specific titles of the federal Public Health Service Act must first go through citizens' reviews on A-95 boards and regional health planning councils before any federal grants can be approved. I have tried to find out from Harvard University for the last few days what the source of funding is for the proposed genetics laboratory. I cannot get a straight answer. If the funds for this lab meet public review criteria, we can at least begin to delay the proposed project.

Another avenue of legal attack are Massachusetts state laws on public health. Chapter 111, Section 2, Paragraph 1 of Massachusetts law states as follows:

"... the Public Health Commissioner may direct any executive officer or employee of the Public Health Department to assist in the study, suppression or prevention of disease in any part of the Commonwealth. He shall submit annually to the Public Health Council a report containing recommendations in regard to health legislation." In effect, Commissioner Fielding has the power to do whatever is necessary to prevent a potential health hazard to the state's residents. He can ask the Governor to declare

a public health emergency in order to stop unsafe research.

Short of that, concerned citizens can enforce other measures. Certainly this kind of research calls for the strictest kind of laboratory control. A safer P4 lab--not a less-safe P3 lab. A clean building, not an insect ridden one. Under Statute 21 of Chapter 111 of Massachusetts law, no one can discharge pollutants into the sewage system. The question I would ask is: should a researcher who becomes contaminated by a new virulent strain of E. coli bacteria be allowed to relieve himself in a Massachusetts toilet? The question may seem funny but the implications are not. There is yet another state law which permits public review of this research. Section 111 24A Paragraph 1 of Massachusetts law states:

"... the Public Health Commissioner may authorize or cause to be made scientific studies and research which have for their purpose the reduction of morbidity and mortality within the commonwealth." Considering that no one knows what will happen when apparently safe bacteria are joined, extra precautions have to be taken. While I don't forsee genetic doom, we cannot assume that serious diseases won't be created. Given the hazardous and completely unknown effects of such research, consumers must demand the right to participate in all prior reviews and studies of potentially hazardous health research. Such reviews should have the weight of approval/disapproval power of any proposed health research project.

Mayor Vellucci: Thank you very much. Next? We have Dr. Wald here. It would be nice if Dr. Wald would come forward and we'll give him some time

and he can say as much as he wants to say. If he's too tired, he can say I'm too tired and he can talk another time. Dr. Wald, George Wald, is the Nobel Prize winner who is in opposition and I'd like to hear from him.

Wald: I think you ought to do something about the temperature. I think we're all pretty tired and the meeting has pretty near come to an end and I think I would most like to ask for a fresh start. I think that many things have been said that need not only to be discussed but to be corrected. There have been impressions left that need to be resolved and a continuance sounds to me like the best thing to do. I ask you, Mr. Mayor, is there any chance of us meeting again in a public meeting of this kind?

Mayor Vellucci: We have a resolution that has been referred to the July 7th meeting. We are going to hold a meeting on July 7th to take up a couple of issues on sidewalks which shouldn't take much time and then proceed at seven-thirty, eight o'clock to let people who want to be heard be heard. He says the hour is late--well, sure we'll get a fresh start if it's okay with you?

Wald: That would be great and let me just say that not having watched the Mayor and City Council in action before this has been a pretty challenging action and I must say I think they took excellent care of themselves and us. Thank you.

Mayor Vellucci: I think we'll get a fresh start here on July 7th.

Duehay: Mr. Mayor.

Mayor Vellucci: Yes, Councilor Duehey?

Duehay: I would like to charge that the record of this meeting be prepared in terms of transcripts. I spoke to your assistants and they said they may need some clerical help. This is a very important meeting. And this record ought to be available not only to us to help us make our decisions but other public bodies.

Mayor Vellucci: Right.

Duehay: I hope that the money can be available to get the extra staff.

Mayor Vellucci: I think what we ought to do is take a vote on the resolution to be referred to the July 7th meeting.

(Motion so made and voted in the affirmative.)

Mayor Vellucci: This meeting is recessed until July 7th.

CERTIFICATE

We, June Gibbs and Gail Farrish, do hereby certify that the foregoing record, Pages 1 through 158, is a complete, accurate and true transcription of our stenographic notes taken in the aforementioned matter to the best of our skills and ability.

June Gibbs, Stenographer

Gail Farrish, Stenographer