

# F.A.S. PUBLIC INTEREST REPORT

Journal of the Federation of American Scientists (FAS)

40th ANNIVERSARY  
RETREAT

Volume 38, No. 6

June 1985

## FAS-BAS 40TH ANNIVERSARY RETREAT



### Conference Participants:

Bottom, seated: l-r: J. Stone, P. Morrison, H. Bethe, J. Simpson, J. Holdren, W. Higinbotham.

second row: l-r: H. Wolfe, D. Inglis, L. Borst, R. Forsberg, B. Feld, J. Wood, T. Hazinski, R. Adams.

third row: l-r: D. Flanagan, V. Rabinowitch, D. Shapley, L. Shore, D. Singer, A. Wood.

fourth row: l-r: (mid-photo) L. Ackland, R. Hardin, R. Wilson, L. Rieser

top row, standing: A. Kimball Smith, F. von Hippel, E. Sensibar, A. Adler, C. Paine, C. Smith, D. Leifer, M. Mann, P. Morrison, V. Lide.

Not Pictured: R. and L. Garwin, W. Greene, B. Hammond, E. Higinbotham, J. and L. Kelleher, C. McGraw, J. Pike, J. and J. Redick.

## FOUR DECADES HAVE PASSED

On May 10-12, the Federation of American Scientists (FAS) and the Bulletin of the Atomic Scientists (BAS) held a joint 40th anniversary retreat to discuss what had, and had not, been achieved since their birth in 1945.

This newsletter contains an excerpted and lightly edited

transcript of the proceedings and a communique (see page 23). As the picture shows on page 1, the attendees were founding members of the movement and key officials of the two groups.

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The notion of a joint 40th anniversary retreat had surfaced at a Bulletin brain-storming session to which an FAS official had been invited to give a key-note address about future courses for the Bulletin. FAS had suggested that a joint anniversary retreat might, in particular, produce suggestions for other joint activities. Indeed, it had been suggested that the Federation, the Bulletin and Pugwash might solicit a large grant for joint (synergistic) activities from someone who wished to become the patron of the various original arms of the scientists' movement. Thus the retreat had a purpose that was more than ceremonial.

In the end, this possibility failed through the reluctance of the Bulletin to become involved in cooperative activities. (Bulletin negotiators even insisted that the final communique provide no reference whatsoever to any possibility of future cooperative activities between FAS and BAS.)

The conference itself, however, succeeded in compiling some interesting observations concerning the arms race. (This condensed transcript contains about 3/4rds of the substance of the original and persons seeking the remainder may find it in a later issue of the Bulletin of the Atomic Scientists.)

In addition to arranging the conference for the two groups the Federation arranged a Monday hearing, after the weekend retreat, before the House Foreign Relations Committee for the three senior panelists at the retreat (Bethe, Feld and Morrison). These hearings are available from the House Foreign Affairs Committee or through the Government Printing Office (GPO).

Since the founding of the movement, there appear to have been two major successes and one enormous failure.

The fact that there has been no nuclear war for 40 years is a fantastic success revealing either that the world has been extraordinarily lucky, that the risks of nuclear war were never as high as originally feared, or that the public reaction to the danger, led by the scientists' movement, had some real effect in changing that probability. Probably all three factors are involved.

A second great success has been a spread of nuclear weapons to new nuclear powers that has been 10 times slower than originally feared. Instead of 50 to 70 nuclear powers, as feared as recently as in 1960, there are five to seven with the newer ones moving very slowly, if at all, to larger stockpiles. This is, very likely, a tribute to the worldwide campaign against the spread of nuclear weapons which has, evidently, bought time to persuade many nations that nuclear weapons are not useful and certainly not inevitable.

The great failure of the scientists' movement has been the continued course of the arms race—now featuring 100 times more warheads on each side than the worst original fears of the atomic scientists. This continues to be the dominant problem of our time.

*This retreat was financed by a grant from the W. Alton Jones Foundation*

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## CONFERENCE PROCEEDINGS



*Hans Bethe, 13 May 1985*

*Hans Bethe, Professor of Physics Emeritus at Cornell University, and a Nobel laureate in Physics for his work on the fusion reaction cycle in stars, headed the Theory Division at Los Alamos. He has long been a senior spokesman for the movement of atomic scientists.*

**DR. HANS BETHE:** In 1945, it was clear to most atomic scientists that we could not keep our monopoly of atomic bombs for long. Fred Seitz and I wrote an article in a pamphlet, "One World or None," stating that some determined country—by which, of course, we meant Russia—would get the atomic bomb in five years. Worse than that, I feared that we might well have a nuclear war within ten years. So in this respect things turned out a lot better than expected.

There was a brave attempt to avoid a nuclear arms race, an attempt which is now almost forgotten. Already during the war, Niels Bohr, James Frank, Vannevar Bush and James Conant urged that nuclear weapons should be internationally controlled.

After this failure, the United States moved full speed ahead with nuclear armaments. The slogan was, "more bang for the buck." The lesson of Hiroshima had obviously been forgotten; namely, that a single nuclear bomb could destroy a whole city. Squadrons of bomber planes were built which would be able to carry nuclear weapons. The Los Alamos Laboratory designed, and other establishments of the Atomic Energy Commission manufactured, new and improved atomic weapons. The yield of each nuclear weapon was steadily increasing.

Nobody at Los Alamos at the end of the War would have expected this in 1945. We might have expected that there might be some dozens or, at most, a couple of hundred of nuclear weapons in our stockpile if the international negotiations failed.

In the summer of 1949, the Soviets exploded their first atomic bomb. While this should have been expected, the Joint Congressional Committee on Atomic Energy was shocked. Of course, the American nuclear monopoly was

gone, but the government should have been aware that for many years to come we would have great superiority in the number and quality of nuclear weapons, and especially in the planes able to deliver them.

However, certain scientists were convinced that we had to keep ahead and that we should proceed to design and build a hydrogen bomb. They found willing support in the Joint Congressional Committee. On the other hand, the General Advisory Committee of the AEC, in a secret report, warned against this great escalation of the power of nuclear weapons. The AEC and the State Department were divided on the advisability of this escalation in the arms race.

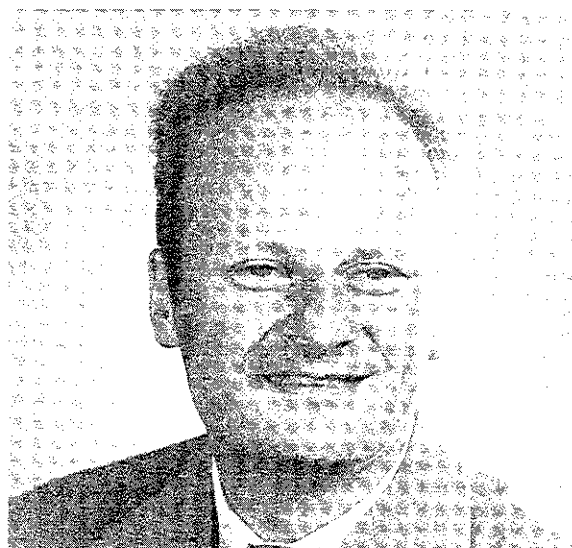
After much deliberation, President Truman decided, in January 1950, in favor of the development of the H-bomb. One of his motivations was the arrest in Great Britain of Klaus Fuchs because it was discovered that he had given atomic secrets to the Soviets during the war, including the ideas about H-bomb design which existed in the U.S. by 1946. Truman's decision was a most fateful step in the escalation of nuclear armaments. Several scientists, including myself, argued in the open literature against the H-bomb decision.

### ICBMs

The next step in the arms race was the intercontinental ballistic missile. For several years, both the Soviet Union and the U.S. had been engaged in developing such missiles. This time, the Soviets beat us to it, testing an ICBM in 1957. They soon followed this by Sputnik, an artificial satellite, which they tested in the fall of 1957 and which greatly raised their prestige around the world.

Missile development was accelerated by the U.S., and the U.S. was the first country to deploy large numbers of ICBMs, beginning about 1960. Soon thereafter, we launched the first intelligence satellites with photographic equipment and were able to discover that the Soviets were deploying very few ICBMs.

At this point it would have been sensible to reduce our plan for our ICBMs, but in fact over 1,000 Minutemen  
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*Hans Bethe at Los Alamos, 1945*

*(Continued from page 3)*

were actually deployed. The introduction of the ICBM meant that the time for decision in case of a nuclear conflict was reduced from some 12 hours to 30 minutes.

Shortly after the test of the first ICBM, we began to take the first steps to arms control, namely the nuclear weapons test ban. The origin of the Test Ban Treaty was the American test series in the Pacific in 1954. By a very unfortunate accident, a Japanese fishing boat, The Lucky Dragon, was seriously contaminated by fallout from one of the tests.

Popular opposition to testing arose. Linus Pauling and David Inglis were in the forefront of this opposition. Soviet Russia used this opposition to embarrass the United States.

In the President's Science Advisory Committee (PSAC), which had just been established by President Eisenhower, there was much enthusiasm for arms control. I proposed to make the test ban the first step. President Eisenhower and Secretary of State Dulles felt very much under Russian pressure, and welcomed the PSAC initiative.

#### Limited Test Ban

The idea of a limited test ban was first proposed very informally by Eisenhower, and was taken up again in 1963 by President Kennedy. After exchanging several friendly signals with Khrushchev, the meeting was convened in Moscow in the summer of '63.

In this meeting, in a very short time—two weeks, I believe—the limited test ban was concluded by the two countries, forbidding tests in the atmosphere, in the oceans, and in outer space, but allowing tests underground without limiting their yield. In these informal discussions, Eisenhower had previously wanted to limit the yield to the equivalent of about 20 kilotons.

This was the first agreement limiting armaments between the U.S. and the USSR. It is still regrettable that the agreement did not also include a threshold test ban on

underground tests, such as 20 kilotons. If such a threshold test ban had been concluded at that time, many subsequent escalations of the arms race would have been impossible.

In addition, it would have frozen the status of nuclear weapons at a point where the U.S. was clearly superior. We had already tested H-bombs of yields considerably less than a megaton, which are essential for multiple warhead missiles, while the Soviets had not yet done so.

We became convinced that the ABM would cause the opposite side to build up its offensive missiles as a countermeasure. The Russians had the opposite opinion, saying that any type of defense is good. You will notice that today the roles are reversed.

#### ABMs

The ABM Treaty was negotiated and signed in 1972. The ABM Treaty is extremely important. First of all, it is a precondition to the control of offensive missiles. Indeed, after the conclusion of the ABM Treaty, the SALT I agreement followed immediately. The ABM Treaty is unique in that it recognizes that pre-Hiroshima concepts of defense are no longer valid. Defense, and especially an incomplete defense, does not make for security. It is the only treaty so far that really goes to the heart of the arms race.

The next troublesome step in the arms race was MIRV—multiple independently-targeted reentry vehicles. These were first proposed around 1967 as the best way to penetrate ABM defenses. This amounts to driving out the small demon by calling in the devil himself.

Once the ABM Treaty was concluded, we should have given up MIRVs because they obviously led to strategic instability. As long as each ICBM has just one warhead, there is no incentive for either superpower to make a first strike against its opponent's ICBM silos. But once one has MIRVs, an attack on the enemy's ICBM could very likely be to the attacker's advantage from the narrow point of view of counting missiles.



*Morrison, Feld, Bethe being introduced to Foreign Affairs Chairman Dante Fascell. Also pictured, standing, is Arms Control Subcommittee Director, Ivo Spalatin.*

Many people who were engaged in the ABM negotiations believe that around 1970 we might have been able to negotiate with the Soviets a ban on MIRV. However, the U.S. persisted in developing the MIRV because we were then far along in our development, while the Soviets were not. Once more, we relied on our technological superiority, which of course is always followed by the Soviet Union. Dr. Henry Kissinger has recognized by now that MIRV was a grave mistake by the government in which he served.

Thereafter, first the U.S. SLBMs and ICBMs were MIRVed, thereby greatly increasing the number of warheads. Then the Soviet ICBM followed. In this way, we got to the present fantastic arsenals where each side has about 10,000 strategic warheads. Because of MIRVs, the Soviet number of warheads indeed increased very greatly in the second half of the 1970s, as the Reagan government has claimed. But this was not an unprecedented increase in armaments; we had just preceded them by MIRVing our own ICBMs and SLBMs, and our Minuteman buildup in the 1960s was even more precipitous.

#### Strategic Defense Initiative

A big new escalation is threatened by the Strategic Defense Initiative. President Reagan, in his speech of 23 March 1983, called for technological inventions which would make nuclear weapons impotent and obsolete. There is little chance that this dream of President Reagan can be realized technically. None of the proposals I have seen is likely to produce such a defense.

SDI looks to me like the great leap forward which Chairman Mao decreed for China in about 1960 in ignorance of technological reality and with disastrous results.

The Russians can find effective countermeasures against our space defenses without needing to compete with us in high technology, which they might find difficult. Instead, they can change the design of their missiles appropriately. They can locate them differently and they can launch them on a different schedule so as to maximize the difficulties for our SDI. This is certainly in their capability.

The strongest countermeasure against SDI is, of course, the building of more missiles. If Russia were to proceed along this path, the U.S. would clearly respond with its own buildup, and the arms race spiral would go still further.

Since modifications and enlargements of their missile force is the best way to oppose Star Wars, the Russians cannot accept arms control limitations on their offensive weapons as long as SDI, as currently conceived, is a central element of our defense program. In Geneva, therefore, the Russians insist on coupling restrictions on Star Wars with any reduction in offensive armaments.

Chairman Gorbachev's speech in Warsaw on 26 April 1985 again stated that the Soviet Union is willing to agree to deep cuts in offensive armaments, but only if SDI is severely limited. As long as President Reagan insists on complete freedom in developing SDI, there will not be an agreement in Geneva.

Agreement could possibly be reached if we take seriously the proposition that we undertake only research on SDI and stay strictly within the limitations of the ABM Treaty.

Paul Nitze, in his Philadelphia speech, defined three phases of SDI, the first being pure research. He implied that if SDI were to fulfill his criteria, we would not proceed with deployment until consulting again with Soviet Russia.

But in order to make this promise believable to the Soviets, it would be necessary to strengthen the ABM Treaty so as to plug the loophole, namely testing of ASATs. This would be to our advantage anyway because we are much more dependent on satellites for intelligence than the Russians are. Unfortunately, the Pentagon, as reported in The New York Times of 21 April, has given notice that while it will obey the ABM Treaty, it will make its own interpretations of that Treaty.

The history of the last 40 years shows that any new technical invention in nuclear arms which we introduce is soon either imitated or otherwise countered by the Russians. Every escalation in the arms race makes this country less secure. This should be remembered whenever such an escalation is being proposed.

#### Arms Control

While technical inventions have made us less and less secure, arms control also has not been very effective. It has, however, done at least a couple of things. First, SALT II has limited the Soviets to a maximum of ten warheads on their biggest missiles, while technically they could put 30 on those missiles. Second, it has limited Soviet ABM and therefore has preserved the effectiveness of our ballistic missiles. Third, it has put nuclear tests underground, thereby cleaning the atmosphere from radioactive pollution. If the test ban were to become comprehensive or were to become a very low threshold test ban, it could also make proliferation of nuclear weapons very difficult.

Why has arms control not done better? Because it has never been supported wholeheartedly. There are always groups in the U.S. government and in Congress who oppose arms limitations, and the same is surely true in Soviet Russia. Often agreement to arms control treaties could only be obtained on the condition that the Defense Department be given new weapons, and the nuclear weapons laboratories new facilities for further development of weapons.

There was a time, however, when the Department of Defense was convinced that good arms control gave us better security than more weapons, and this conviction was then held not only by the leading civilians but also by the Joint Chiefs of Staff. I can only hope that before another 40 years have passed, the conviction that arms control is essential to our security will become widespread. No technology race can make us secure; only negotiation with the other side can do that.

#### BETHE ON TELLER

**I don't think it makes any sense to invite Edward Teller to write a defense of the Star Wars. He is, as far as I could judge by a recent visit to Livermore, ignorant of the technical issues, and he will just state generalities.**

### WHO WAS BORN FIRST?

The Federation appears to be some weeks older than the *Bulletin* whether measured by date of organization, date of announcement, or date of first publication, and claims, accordingly, to be the oldest American organization devoted to controlling the arms race.

According to Alice Kimball Smith's work on the origins of the scientists' movement: "The organization meeting of the Federation of Atomic Scientists was held in Washington on Wednesday and Thursday, October 31 and November 1." (p. 203). The FAS put out its first newsletter "dated November 5" (p. 204), and on November 8 "held a press conference at 11:00 am in the office of Senator Mitchell of Washington to announce

(its formation." (p. 207).

By contrast, The *Bulletin of the Atomic Scientists* (BAS) was "authorized by the ASC (Atomic Scientists of Chicago) executive committee on November 24..." (p. 294), and Volume I, Number 1 of the *Bulletin of Atomic Scientists of Chicago* appeared on December 10, 1945 (italics in original), pg. 295.

Both organizations made certain changes to their original name, with the *Bulletin* dropping "of Chicago" and the Federation changing "Atomic" to "American". The *Bulletin* later further changed its name to "Science and Public Affairs", but changed it back still later.

*Bernard Feld, Professor of Physics at MIT and former assistant group leader of critical assembly at Los Alamos, has been an indispensable man in the scientists' arms control movement, as a leading figure in the International Pugwash, a co-founder of the Council for a Livable World, and as Editor-in-Chief of the Bulletin of the Atomic Scientists.*

**DR. BERNARD FELD:** In the early days of the post-war formation of the Federation of Atomic Scientists, later called the Federation of American Scientists, our movement had a rather simple slogan. It was a three-line slogan. First that "there is no secret." (This was a direct contradiction to the assurances that the American people were being given by General Groves and others, that the Russians would not be able to repeat our accomplishments in anything less than 20 years because we had the "secret" and they didn't have the "secret".)

Second, that there was no defense against nuclear weapons because they could be delivered in a great variety of fashions. Third, that, therefore, the only solution for us was international control.

It is clear to me in hindsight that no international agreement could have been accomplished until the Soviets had demonstrated their own independent capability—to themselves and to the world—for producing nuclear weapons.

#### Early Lobby Efforts

But we were much more hopeful, and perhaps a little more naive, in those days, and we really felt that this was an approach worth trying to sell, and we went about selling it the best way we knew.

We descended upon Washington. We set up a lobbying activity under the directorship of Willie Higinbotham, who is here with us today, and people from all the branches of the Manhattan Project would send representatives to Washington to lobby. And lobbying in those days was a very easy procedure.

I would go to the office of a Congressman or a Senator, knock on the door, and the door would open, I would walk in and say, "I'm Bernard Feld, I've just come from Los Alamos" and the red carpet would be spread out. We were



*Bernard Feld, 13 May 1985*

great heroes then. And they would say, "Well, what can I do for you." And then I would give him my spiel.

And in the end we succeeded in one objective. We were able to defeat the bill which General Groves had had hastily drawn up right after the war: the May-Johnson bill. It would have placed all future atomic energy developments of all kinds, military or civilian, under the hands of a military agency—a perpetual Manhattan Project so to speak.

We were able to get the McMahon bill, which set up a civilian, independent atomic energy agency with various safeguards so that all the relative voices would be heard in the decision making process. On the whole, that has worked out, not marvelously well, but reasonably well.

After that was accomplished, most of us went home—as General Groves put it we were "all very anxious to return to [our] future lives".

Well, we all went back to our future lives and set ourselves off on new and different careers. Since then, many of us have felt that the situation called upon us to come back. With respect to the Star Wars initiative of the current Administration, the situation strikes me as being

remarkably similar to the one which we faced in the early post-World War II days, namely the threat that in fact there will be established a new military enterprise in this new area.

The most direct Soviet response will be to build up their missile deployment to a point where they are capable of saturating any system we have and still have enough left over to produce unacceptable damage.

Then the presently absurd and almost obscene levels of nuclear deployments, on the order of 30,000 nuclear weapons, each with the order of a few thousand intercontinental delivery systems, will grow even beyond this crazy level.

### Non-Proliferation

There is, of course, one other area which we have been involved in, by "we" I mean collectively—the scientific groups, FAS, The Bulletin, PUGWASH, and others who have worked with us and have come in somewhat later, such as the Union of Concerned Scientists—and that is the problem of trying to hold back the flood gates, so to speak, of preventing the spread of nuclear weapons beyond where they have gone.

Up to now, only six nations have publicly demonstrated, by actually exploding a nuclear device, the capability of doing so. But it's obvious to anybody who has sort of looked at these things that there must be a least a dozen nations who either have this capability and could, within a very short period, produce one or more nuclear weapons. And that this number is going to grow from a dozen or so, to maybe twenty or thirty within the next decade or so.

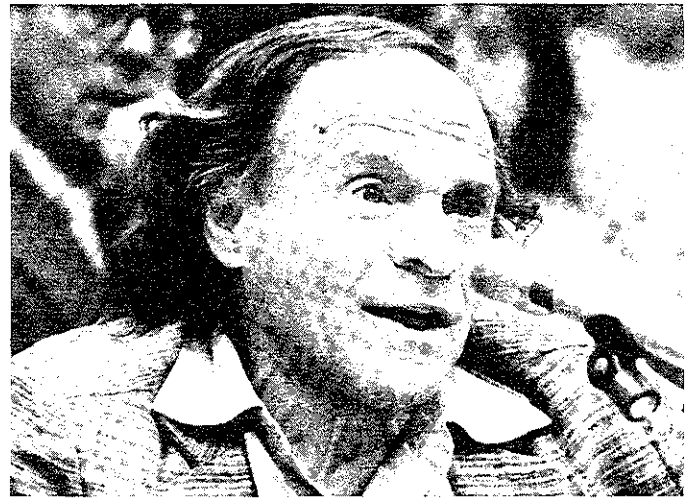
So, the only hope for preventing the actual spread of nuclear weapons is to maintain the conviction among the political leaders in the smaller countries that their security interests are best served by staying out of this game—that they get more out of being non-nuclear as far as weapons are concerned than demonstrating a nuclear weapons capability.

This can best be represented by the metaphor of the dike. Once there's an opening in the dike, the waters are going to go pouring through. If Israel demonstrates nuclear weapons, the Egyptians are going to work like crazy to demonstrate one. Since India has succeeded, Pakistan is straining its technical capabilities to do the same.

Somehow or other, we'll have to find a way of strengthening this nonproliferation notion.

*Philip Morrison, Institute Professor and Professor of Physics at MIT, was a member of the Implosion Division at Los Alamos. A founding member of the Federation of American Scientists and an unfailing source of guidance and wisdom for the arms control community, he is the co-author of an acclaimed book, *The Price of Defense*.*

**DR. PHILIP MORRISON:** An important question which I, myself, have been debating this last year is this: was the coming of nuclear energy and nuclear weapons a strange phenomenon or not? Was it one of those things that was remarkable, or is it something you can expect to happen again at any time—a gigantic new surprise out of some laboratory?



*Philip Morrison, 13 May 1985*

I think that fission had one remarkable precedent. The precedent was the beginning of modern physics itself, which I date to January of 1896, when the world learned that Wilhelm Roentgen, in a provincial German university, had made some kind of radiation that would take a picture through the hand, that rendered matter utterly transparent.

I recently met a man on his one hundredth birthday in Oklahoma City. And he told me the story of his being an undergraduate physics student at Colorado College in January of 1895.

His professor came in, having read the newspapers that morning, and said, "Gentlemen—we're going to spend this morning without the ordinary laboratory and without the ordinary lectures, because I read something in the papers so remarkable that I want to try to duplicate it myself, and I think we can do it. And if we do it promptly this morning, we might be the very first in the United States to do such a thing."

And so they scurried about and by the end of the morn-  
*(Continued on page 8)*



*Philip Morrison at Los Alamos, 1945*

*(Continued from page 7)*

ing, with the apparatus they had on hand, they had taken a picture through the human hand—and a coin through the Bible, the other characteristic thing that you did.

And the hundred year old man remembered running to the chapel. He got a good Bible, so they got a good picture.

Now, they were very happy, but they were not, in fact, the first Americans, let alone Europeans, to repeat this experiment. They were not the first, because they labored under the insuperable handicap of longitude. When they went to work at 9:00 in the morning, it was already 11:00 in the morning at Hanover, Philadelphia, New York, Ithaca and so on. Six or eight places duplicated the experiment on the first day.

### Technology Today

If you see what they do in Cern or Fermi Lab these days, nobody's going to reproduce that next week in his laboratory. It's just a different world.

That is somewhat helpful, I think, because it suggests what I think is absolutely true, that there is not much contained that we can see in science, at least in physics, that has that quality anymore. It was once. It won't happen again.

Perhaps the most important success of all subjects is the complex rise of solid state physics, communications theory, control theory, information theory—an enormously ingenious technology which has given rise to the computer world. And it's only the beginning.

But it doesn't have this disruptive, energetic quality, and it returns to an earlier marginal kind of competition, when it is turned to military applications. But the margin is not very important, since nuclear weapons uniquely exceed their predecessors by many orders of magnitude, which no other innovation generally does.

Meteorology and geology, which have made great strides, contain faint echoes and seeds of environment modification, but none of them look as though they will lead in any way soon to weapons systems. Cognitive psychology which might be imagined to be a kind of science that could change the minds of people, again has not succeeded. The best way seems still to be the television screen and no more subtle procedure has followed from that.

The only case where we do see in embryo or, let us say, in portent, the possibility of powerful new and terrible weapons systems is the enormous growth since the mid-'50s of microbiology, in biogenetic engineering. And here there is an extremely fortunate circumstance, probably derived as a lesson from the failure of the physicist, the historical failure that nuclear weapons were initiated at the time of a most terrible war.

The circumstance is that a workable, if by no means perfect, treaty against the development of these weapons was obtained by international agreement just in the nick of time, just five years before the technology matured.

The fix we're in now is that the nuclear danger has been transcended a hundredfold.

I feel now that the discussion of nuclear weapons, of arsenals and of the nature of the instruments, and all those

things, is really more or less beside the point. These factors do not permit us to predict the weapons that will be built or the size of our arsenals, or the arguments of the statesmen—which argue black is white on one occasion and white is black on the next occasion, with perfect equanimity.

When we said, "MIRVs will come back to haunt you", they said, "not at all. It's essential to beat the ABM." And now, they admit MIRVs are going to haunt us.

So, the technical arguments don't matter, in my opinion. Nor do the nature of the weapons matter, in my opinion, in trying to understand what the statesmen have done. What has happened is the institutions of national power and pride and production and military force have been given a new capability. The environment has stayed the same, but they got a new capability.

Unfortunately, it's very cheap. Unfortunately, by spending the same amount for the Air Force that you always spent, it will now do a hundredfold more damage. That's the only thing that's happened.

The only way in which the survival of the American people and their state could be put at risk is by intercontinental strategic warfare, and that is the kind of warfare promoted, developed, pioneered, and given enormous tax dollars by the United States government.

And the explicit statement of this principle was made by Billy Mitchell and the RAF's Hugh Trenchard in 1918-19: War beyond the battlefield, war into the interior. That's fine, if you're ahead and look at the oceans and feel safe.

The United States has developed and pinned itself to a picture of ultimate war which is the only thing that could have been found in the world to reduce the remarkable geopolitical and historical position of the United States. Very strange.

And one understands why. By incremental decisions, each one of which looks plausible and looked as if it was conferring an advantage many times continued have conferred the only terrible loss to our native advantages that we could possibly have made.

Of course, it couldn't have been provided forever. You can say they didn't invent all this. They didn't. They had heavy competition. But it is one thing to have competition; it is another thing to be out first on everything. And it's plain that there is a solution, only one solution—the same



Lyle Borst



solution that Bernie alluded to, the same solution that was announced by the Federation's predecessors in late 1945.

There's no secret. There is no defense. That means we didn't know about lasers in space, but it didn't matter because you knew that the methods are many and that the leakage could not be tolerated. That the only solution to be made is international agreement for control of nuclear weapons.

#### Audience Comments

DR. BORST: I'd like to ask Dr. Feld to extend his remarks, because I understood his last statement to be that the United States was providing reprocessing equipment for plutonium, whereas the Russians were very respectful of plutonium. But the implication was that the Russians were providing reprocessing.

DR. FELD: No, that was not what I intended to say. The Soviets, I think, in this respect have been much more responsible than countries of the West. The Soviet Union provides most of its satellites with nuclear power reactors. They are great believers in the future of nuclear power.

But to my knowledge, they have an inviolable system of providing this, namely at all stages reactor fuel belongs to the Soviet Union. The Soviet Union processes the fuel elements. Soviet representatives bring them to the plant and place them in the reactors. When they are ready to be removed, Soviet representatives come, take them out, put them in their lead caskets or whatever, ship them into the Soviet Union, where the reprocessing is done.

There is no reprocessing done outside the Soviet Union with respect to any plant provided by the Soviet Union. So, they are really very much concerned about this proliferation issue.

On the other hand, in the West, we've gotten into a situation where there is commercial competition for the selling of nuclear reactors.

This kind of commercial competition has the possibility of producing plutonium which could be used in weapons.

DR. GARWIN: The Non-Proliferation Treaty (NPT) is a fine thing. However, a country is perfectly allowed under the NPT to have nuclear power, to have separation facilities, to produce a stockpile of weapon-grade plutonium, just so long as it is internationally safeguarded—that is, observed.

But they are not then necessarily very far from having nuclear weapons. What has saved us so far is that nuclear power has had a rather high cost. If reprocessing had fulfilled its promise of being very cheap, it would have resulted in stockpiles of plutonium around the world.

I think we're fortunate. I don't know how long that respite will last.

#### Risk of War

DR. BETHE: I don't think that nuclear war is now more imminent than it was in the past. And one of the reasons for this opinion is the Scowcroft Commission Report, which has made it perfectly clear that a first strike is completely suicidal for either side.

And I want to emphasize once more the invulnerable nuclear submarines. Neither side can make a first strike



Chris Paine

and get away with it. Of course, the Russian land mobile missile is their answer to that. It is clearly meant to be a second-strike force, a survival force which cannot be hit through our knowledge of the positions of the nuclear weapons. This is precisely in opposition to what President Reagan said the other day about mobility being destabilizing.

I think the only way we could get to a position where a first strike would be conceivable is through the Strategic Defense Initiative. In this case, in the one in a thousand chance that it was successful, then we would be in a position to make a first strike, because we could then deal with the Russian counter-strike—after having eliminated a large part of the Russian force.

At the moment, and for the foreseeable future, there is no possibility of a first strike by either side. By far the most dangerous scenario is that nuclear war will come about through a conventional war in Europe, and then will go to small nuclear weapons. And once we have crossed the nuclear threshold, then all bets are off, and there is no way to prevent co-escalation.

#### Role of Scientists

MR. PAINE: I want to ask the panel to try to assess the relative responsibility of the scientific community for the arms race.

I know Herb York has tried to do this recently. He asserts that the scientific community has played a critical, central role—more of a role than it likes to admit to itself—that it's not simply responding to ideological, political or military requirements, but is taking a leading role, in propelling the arms race forward, not accidentally, but as a result of bureaucratic, and other, interests.

I wonder if you could address that, both historically and also projecting into the future. Why has the scientific community not been more successful in restraining its members and cleaning up its own shop?

Any second rate engineer can get a job in one of the weapons labs and make what he thinks is a real contribution to the increase of weapons capabilities at the level which these labs consider important.

DR. BETHE: I agree with you that there is far too much eagerness on the part of many scientists to go into the nuclear arms race, and I see that in two ways:

*(Continued on page 10)*



Leonard Rieser

Industrial companies, weapons laboratories, and, I am afraid, universities, are terribly eager to profit, through contracts, from this new, bright source of SDI funds. My own university, especially its engineering school, is terribly eager to get unclassified contracts to work on certain engineering aspects of SDI. That's awful.

And at the same time, the weapons laboratories have a great attraction for young scientists, not so much because they want the money, but because when you want to do applied research—when you want to do fundamental engineering, these are the most interesting problems.

It is far more interesting to work on SDI at Livermore or Los Alamos than to improve an automobile. And so a young engineer, if he wants to do innovative things, is much more likely to do this in areas which are counter-productive, weakening our national security rather than in conventional engineering.

DR. MORRISON: I think we're facing the fundamental problem of the post-Enlightenment, which is the struggle between reason in the laboratory and nationalism. I don't think these two forces, which I believe to be the most important forces for two centuries, can forever coexist. Something has to give.

What you're suggesting, if I'm not mistaken, is that an institutional class, like the scientists, might take something like a limited pacifist position and fight against their own contributions to what was otherwise judged by society to be in the broad national interest.

I've never thought that would succeed. What it will do is divide the community as in pre-World War II France, when the right and the popular front were in competition. The Paris physicists could not talk to each other. There were two seminars and no one went to either one.

The power of the nation state is too great: its economic power, its power to enlist people, its power to shape institutions smaller than itself, like universities, schools, and so on.

DR. WILSON: I think I agree completely with what Phil said. I would want to emphasize, though, that if we could all walk in unity then we would probably do just the opposite from what you want. In any case, we can only do that by having a dictator, and I'd like to emphasize that, in fact, we're individuals.

The things that we say are generally not scientific—not motivated by or following from scientific thought. Our motivations reflect the broader humanistic and cultural milieu outside of our disciplines.

MR. PAINE: I'm not proposing some sort of pacifist guild organization for the scientific community.

I think I'm merely proposing what George Rathjens put forcefully at the NAS meeting on the SDI, where he said, "Isn't it time for the scientific community to come together and force some discipline on the kinds of arguments it's willing to accept relative to the projects it's willing to undertake"?

*Robert Wilson, Professor of Physics at Cornell University, and the former Head of the Research Division at Los Alamos, is a former director of the Fermilab in Batavia, Illinois, and the architect of several accelerators. The first elected Chairman of FAS in 1946, he also serves as Chairman of the Board of Sponsors of the Bulletin of the Atomic Scientists.*

DR. ROBERT WILSON: I'm going to take up some specific cases of scientific responsibility and I'm going to give each one a grade.

The first case has to do with the first use of an atomic bomb before the war was over. I give us an F. We were not organized effectively or soon enough.

The best effort was that at the Met Lab in Chicago, but it was a failure. Their letter ended up unread essentially—perhaps there were good reasons having to do with necessary security or because we were too all-out in our efforts.

Right after the bomb was dropped, we did our homework and came up with the three essential points of our doctrine: that there was "no secret" (i.e. no possibility of a nuclear monopoly) "no defense" (i.e. against the bomb), and that it was necessary to have "international control" if an arms race was to be avoided. We were certainly correct on all of those and I give us a B-plus because at least we put forward our message and to some extent it was heard.

#### May-Johnson Bill

The first issue that came to us as a group was the issue of civilian control of nuclear energy, mainly the problem of the May-Johnson bill which had the support of the establishment—that is, the established heads of all of the large laboratories.

Had not the scientists come forward forthrightly and vigorously, the May-Johnson bill would likely have passed, and things would have been much worse today than they are.

It was a terrific fight and I give us a self-congratulatory "A."

Next there was the international control of nuclear weapons. Here the FAS, or the atomic scientists generally, supported our established figures, such as Oppenheimer and the State Department, when they came forward with the Baruch plan.

Everybody pitched in. And it was a damn good try which I give "C" for effort, if "F" for failure. I give a C

for effort because it opened visions of what could be done on an international basis, and we got a good education from working on it.

### H-Bomb

Next is the hydrogen bomb issue. We went out joyously to fight that one. We knew what we were about. We realized how important it was going to be for the future.

But I give us an F on that one because we just failed miserably. That could have made a tremendous difference, had we fought a little harder, had we been able to clarify the issue a little better. I don't know what went wrong that we were not able to get more support from other people, because the issues were simple. But we didn't. And I can't even say that we learned anything from our failure. Alas, ashes.

### Oppenheimer

The Oppenheimer affair was another one of our issues, and again we failed. And there I thought that we lost something particularly important for the nation. That our nation would have done such an indescribably bad thing, so it seems to me, as to have withdrawn Oppenheimer's clearance was something of which I am deeply ashamed.

And I am ashamed also that we could not have put up a bigger battle because it meant so much in terms of what this country stands for. So I give us a forthright F for that matter.

### Test Ban

Then we come to the test ban. Now, that's more of a complicated matter. The restricted test ban, that ended well in many ways. I give us only a B because we got much too involved in the technology of the test ban—equations, first movements, all sorts of technical matters. That's of course necessary. But somehow it got into our public expressions.

It was largely Mr. Harriman who came in, cut the Gordian knot, and went up and just got an agreement in spite of all of the complications that we had made for him. That's why I only give us a B. Probably I should give us a C. I think it was the State Department that accomplished this, and that's something of an indignity!

### Human Rights

I will give us a B on the issue of U.S.-Soviet scientific collaborations on the one hand and human rights on the other.

What we largely came down to do was to stop the collaborations and to insist on human rights.

In retrospect, our emphasis on human rights, to the point of stopping many of the scientific collaborations, has not been effective. Academician Sakharov and Ms. Bonner are in worse shape today probably than they were previously. And most of our Soviet friends, whose human rights have been in jeopardy, are still deprived of their human rights. And I can't see where we've done as much good as if we had maintained our scientific collaboration.

Now, it doesn't mean that one gives up human rights for this, although it is inconsistent to push for these collaborations, and to push for human rights at the same time, I think that this is something that scientists particularly understand. These are complementary values. One can



Robert Wilson

push for both of those at the same time. One might do better by going and arguing as vigorously as you can on the spot rather than doing it from a distance. I give us a B.

### Star Wars

I'm not going to give us a grade for Star Wars because it's not over.

At present we are not doing well. We have not gotten scientists behind this issue. We have not gotten our own thoughts in order. I think that, apart from Dick Garwin and Hans Bethe, and Kurt Gottfried, and a few others, the rest of us have not risen to the very serious challenge that this represents.

We not only have disarmament at risk, but we probably have our civil rights, and what we mean by science in this country, also at risk. I hope that my probable C will be raised to an A.

I want to stress the importance of time and chance in all of these successes and failures. We all understand that, in politics, one doesn't know how it's going to come out. One has to go out with the risk of failure, not knowing what's going to happen. And we know that fortune favors the prepared.

*Richard Garwin, IBM Fellow at the Watson Research Center, and former member of the President's Science Advisory Committee, is widely believed to be America's most versatile and skillful analyst of arms race issues.*

DR. RICHARD GARWIN: My first involvement with any of these matters was in 1950 when I went to Los Alamos in the summer, for the first time. There I designed an experiment to measure the reaction rate of deuterium with tritium and deuterium with deuterium, because if we were going to have a hydrogen bomb we ought to know whether it would work. And, in fact, they were not very good at the time. At the same time, I identified, I think for the first time, the effects of fratricide among nuclear weapons.

The next year I helped in transforming the Teller-Ulam idea into a preliminary design of the hydrogen bomb, and I designed some deliverable versions of that liquid hydrogen fusion weapon.

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By then I had kind of a philosophy of involvement. My personal goals, somewhat grandiose, were to avoid nuclear war and to prevent population growth and environmental catastrophe.

Of course, a scientist has to use reasonable means. My precept was the golden rule—you shouldn't do something you would deny to somebody else—and the preservation of our democratic system of government. So I was a supporter of the Constitution, and I still am.

In the 1950's and 60's, I spent most summers at Los Alamos, in 1952 a month in Korea and Japan, and I was a minor consultant to Convair and to Avco on the intercontinental ballistic missiles. When I joined IBM in 1952, I spent two years part-time with the MIT crowd and worked on continental air defense.

With the launching of Sputnik, the President's Science Advisory Committee (PSAC) was brought into the White House, and I worked with them on various panels and as a member for many years. I worked with Hans Bethe and others on the strategic military panel. Now I'm going to discuss the successes or failures of the movement.

#### **Ballistic Missile Defense**

The ABM problem was brought to a head by Secretary McNamara's announcement in 1967 that the Johnson Administration was going to deploy a limited ballistic missile defense against the Chinese. Some of my colleagues even suggested that this meant we had lost the fight against ABMs, and that we ought to move on and fight the MIRV.

But, in fact, many of us didn't give up and I think it was very largely activities of the scientists which brought the Government to negotiate, and to persuade the Soviet Union of the disadvantages of ballistic missile defense and hence to ratify the SALT I and the ABM treaties.

So on ballistic missile defense we should get a pretty good grade. One residual problem there was that we didn't fight hard enough after the treaty was ratified to keep the

United States from building that totally unnecessary Safeguard system, which was built at a cost of maybe \$4 or \$6 billion or more after 1972, and turned off within a year. It was totally unnecessary.

However, I think the ABM Treaty is an enormous accomplishment. I think if you regard the arms race with MIRVs as a problem, you should see what we would have had, had we not limited the ballistic missile defense and had an offensive—defense exponential competition.

#### **MIRV**

The MIRV, of course, is similarly unfortunate. It was approved by Secretary McNamara in the 1960's, ostensibly to penetrate an evolving Soviet ballistic missile defense system, but the military wanted it for a lot of other reasons. Once again, when the Soviet ABM system was strongly limited, we should have halted deployment of the MIRV, even though we had tested it adequately.

The argument not to halt deployment of MIRVs was a very strange one. It was that since we had tested the MIRV and the Soviets had not, they would never agree to ban it until they had tested their own MIRV. But we never offered them the opportunity to agree to a ban without tests. So, that is a failure. Kissinger accounts it as his personal failure of inattention, although it was certainly called to his attention a lot of times.

Then, there were a lot of other things that went on, some of them rather unheralded. I think that the satellite observation has been a great success of the scientific community, although most people are unaware of its origins.

There were things that were killed so rapidly—the multilateral force—that we don't even worry about it now or add it to our credit. But I think opposing it, and laughing at it, eventually bought time for it to disappear.

#### **Biological Warfare**

The 1969 unilateral undertaking by the Nixon Administration to destroy all offensive biological warfare materials and preparations was a tremendous success—probably not so much of the movement as a personal success of Harvard biochemist Matthew Meselson.

There was a panel of the President's Science Advisory Committee which advised the President that this is what he should do, despite a great deal of contrary advice. President Nixon complied. Why, I don't know. I suggested to a friend that it might be because it was the right thing to do. And he said, "if so, it was the first time anything had been done for that reason in Washington in twenty years".

But many suggested that if we did this unilaterally, it would stand in the way of getting any international treaty binding the Soviet Union to eliminate offensive biological weapons. In fact nothing of the kind transpired. We did it unilaterally, and the Soviet Union right away converted this into a bilateral treaty, which was then open for international accession. This has been a big success, at least as a declaratory policy.

I think that we and the Soviet Union and a lot of other countries would have much greater fears of biological warfare and also larger biological warfare inventories, had it not been for that 1969 Nixon Administration undertaking.



Richard Garwin

It's very strange that, in the re-election campaign, they never mentioned this success of the administration.

### Goals of Arms Control

The classical goals of arms control are to reduce the probability of nuclear war, to reduce damage before it comes, and to reduce the burden of accomplishing the first two goals.

Now, what stands in the way of achieving these goals of arms control? It is the desire to emphasize the two of them. The reduction of the probability of nuclear war and the reduction of damage if war comes are goals which probably cannot be achieved simultaneously.

One should not give up on achieving a large fraction of one or two of the goals, even if one doesn't make progress on the third. And if one selects reducing the probability of nuclear war and reducing the burden of defense preparations as the two primary goals, one may in fact be able to make considerable progress.

One of the reasons that we have done so poorly in pursuing these goals is the institutionalization of negotiations, and the power given to political opponents to negotiations.

The 1963 test ban sort of crept up on people. Opponents did not have the time to organize. And the ABM Treaty was the last time one had a strong president who was able to negotiate—confounding his enemies and deceiving his friends.

The SALT I Treaty had less impact in limiting forces, and it embodied also an implied commitment to build these forces which were not prescribed.

After that, the mere thought of extending arms control made the supporters in the government hesitant, and empowered the opponents. This was especially true after the Jackson Amendment committed the Senate and the government not to accept forces inferior to those of the Soviet Union in any future arms control negotiation and the demonstration of the power of Senator Henry Jackson and his aide, Richard Perle, in purging the Arms Control Agency for its success.

Jim Schlesinger, in a speech last October, commented that he had never had such a shock in his life as when he was in the Office of Management and Budget to find that the votes of the patriots in Congress for the Safeguard program—even those people who were outstanding spokespeople for it—could be obtained only by a flow of dams, water projects and post offices to their districts.

But if one impedes progress toward national goals for local political benefit one is going to have difficulty achieving national goals and preserving the democratic process.

We have to go back to what President Eisenhower said: that we need what we need, not what they have. The Nixon Administration toyed with this in one of the State of the World messages in which they had as a goal "sufficiency" instead of "superiority". But that didn't please enough people and was soon dropped.

In my opinion, the institutionalization and professionalization of arms control and national security analysis leads to the inability to call a spade a spade. It leads to not enough people asserting that the emperor has no clothes, and to people being unwilling to publish something which

is old—even though it is still good and true—in favor of some new thought.

All too often you find people publishing something which is new to them and could have been said better by the people who said it in the first place. But their elders were reluctant to say again what they had said so well twenty and thirty years ago.

Then, there is too much detailed analysis. You can't play in this game unless you know how to do various kinds of operations, analysis, and you do it absolutely right. Even when the model which is being analyzed has very little relation to reality and too little recall of the things that are human.

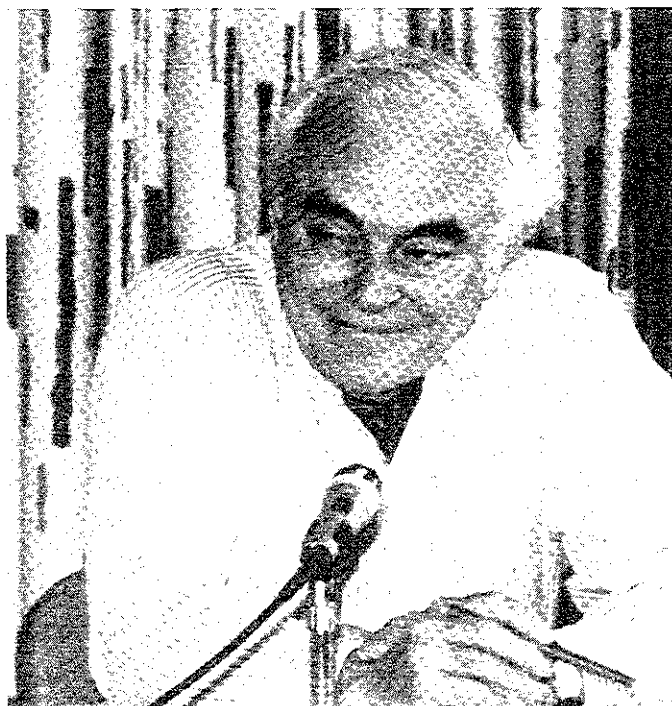
### Scientific Advice for the President

One worries about the government process. We used to have the President's Science Advisory Committee, which was far from perfect. And its advice was often not taken and sometimes even not given. But at least it was there until PSAC was eliminated by President Nixon in January 1973.

Perhaps President Nixon could not tolerate what he said he would tolerate, namely the members of the President's Science Advisory Committee and its consultants talking to the Congress, giving formal testimony, saying what they thought should be done about the ABM system and about other matters even when there was never any indication of a leakage of confidential information, classified information, or anything like that.

Now the informed and influential and independent views of the eighteen members of the President's Science Advisory Committee, and the scores of consultants, are replaced in large part within the government by organizations set up to carry out programs which have not been thought through.

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*John Simpson*



Randy Forsberg

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For instance, the Strategic Defense Initiative had never before been considered in this Administration. Without any preparation, the National Security Council issued their National Security Decision Directive on eliminating the threat of ballistic missiles.

General Abramson regards it as his duty to carry out the program outlined by the President, and the Fletcher Committee, and not to ask whether it should be done. So here, you see, we have an administration following a president who's been characterized as having a whim of iron.

#### Congress and SDI

And you have a Congress which does not demand what is its right and well within its power to obtain. You have a Congress which connives in its own self-deception. It could deny appropriations to any government program which is not explained by a good technical report with sections for the program, sections against the program, and sections providing alternatives.

And if the government agency is not able to bring itself to write arguments against its program, I know a lot of people who for a modest amount of money and access to the program would be glad to provide their best efforts.

The government was denied a lot of power in the Constitution in order to preserve the individual rights of the citizen. But the government maintains this power, not in criminal suits against individuals—because that was protected by the Constitution—but in using unwarranted force and resources in arguing for its programs and against opposition.

#### The MX

For instance, so sterling a character as Antonia Chayes, when she was Deputy Secretary of the Air Force, not only carried out her management responsibilities very well, but conducted an aggressive program to gain approval for the MX missile.

**“We have an administration following a president who's been characterized as having a whim of iron.”**

I suggested to her that she had a responsibility to inform not only the Air Force but the Department of Defense and the Administration and the Congress and the public, not only of the good features of the MX basing proposal, but of its warts and of the good features of the alternatives.

She acknowledged that she regarded herself as the lawyer for the MX. Well, the MX is not an individual person subject to prejudice, or to prosecution, whom she is defending. The MX is a system, and the Congress and the people are being denied information bought and paid for by public money in the Air Force. Tens of millions of dollars of analysis was concealed, because it did not forward a program which was not yet the law of the land, but only a wish by the Air Force.

*Randall Forsberg is the founder and director of the Institute for Defense and Disarmament Studies. A leading organizer of the nuclear freeze movement and author of The Call to Halt the Nuclear Arms Race, Ms. Forsberg is an FAS Council member.*

MS. FORSBERG: For forty years, people in the peace movement and the arms control community have been trying to get the world, the United States and the Soviet Union, to move in the direction of minimum deterrence, by hook or by crook, whether it's through a test ban, or percentage annual reductions, or the SALT process or through unilateral restraints.

The ultimate goal has been to widen the firebreak between conventional and nuclear war and to reduce the likelihood of nuclear escalation in the event of conventional war.

The basic thrust of my argument is that if you've tried something for forty years as a quick fix, then you should start thinking about something else. In fact the idea of widening the firebreak between nuclear and conventional war was intended as a quick fix, a way of reducing the risk of nuclear war in a world where you couldn't end warfare and get rid of armaments—where you couldn't have general and complete disarmament. The concept behind this approach has been that we should reduce the risk of nuclear war by taking what are obvious steps to do so.

Forty years shows that the minimum deterrent approach does not have the capacity to create a winning political consensus. Reiterating the effects of nuclear war, and the dangers of nuclear war fighting systems, publicizing them more widely, phrasing them more eloquently, is not going to work.

To get down into the hundreds—let's say two hundred weapons on each side—would be a 99 percent cut. Yet there would still be enough weapons to destroy all of the major cities in the United States and the Soviet Union.

That goal is what I refer to as the minimum deterrent goal—shrinking back, no matter whether you want to do it quickly or slowly, and to which you give a priority.

There's another end of the spectrum represented by Edward Teller, Colin Gray, and perhaps two or three other people in the United States, who would like to not merely have very large nuclear forces aimed at military targets on the other side, but who would actually like to go for a war-winning nuclear capability.

Now, what's the difference between the Teller-Gray position, and the predominant position in Washington today and over the last thirty years? The difference is not great. In fact, the difference doesn't reside in the offensive nuclear weapons at all.

Where the difference resides is that the Tellers and the Colin Grays would like to add defenses to the very powerful, and very large, offensive nuclear forces which threaten all of the nuclear and conventional capabilities on the other side. Defenses, so that we can catch those weapons which we don't destroy in a pre-emptive first strike: active defenses, air defense, ballistic missile defense, anti-submarine warfare—which is moving ahead unnoticed but very strongly—and for the real extremists who really believe in this, a massive civil defense program.

#### A War-Fighting Policy

There is a third position in the middle. This is the position which has controlled American policy and Soviet policy even though it doesn't appear to.

This is a war fighting policy, not war winning but war fighting. It means support of large counterforce strategic and battlefield nuclear weapons, but without all the defenses. This position has very intractable qualities which comes from its logic.

The concept is one that concedes that one can't fight and win nuclear wars. Therefore it doesn't matter if we have forty thousand nuclear weapons or much less. There's a huge disincentive to using these weapons.

Because the war fighters of the establishment agree with the minimum deterrence community that nuclear war cannot be won, it would be dangerous to allow the other side to think that you have a war *winning* capability.

But these points do not lead to support for minimum deterrence because there is another consideration besides the probability of a pre-emptive nuclear attack or an out of the blue nuclear war. And that consideration is the prospect of a major conventional war, like World War Two, among the big powers.

The effect of this is that the public is ambivalent. People do indeed want to get rid of nuclear weapons, but they're very susceptible to the war fighter—the analyst who supports war fighting forces, who supports first use and battlefield weapons and counterforce options.

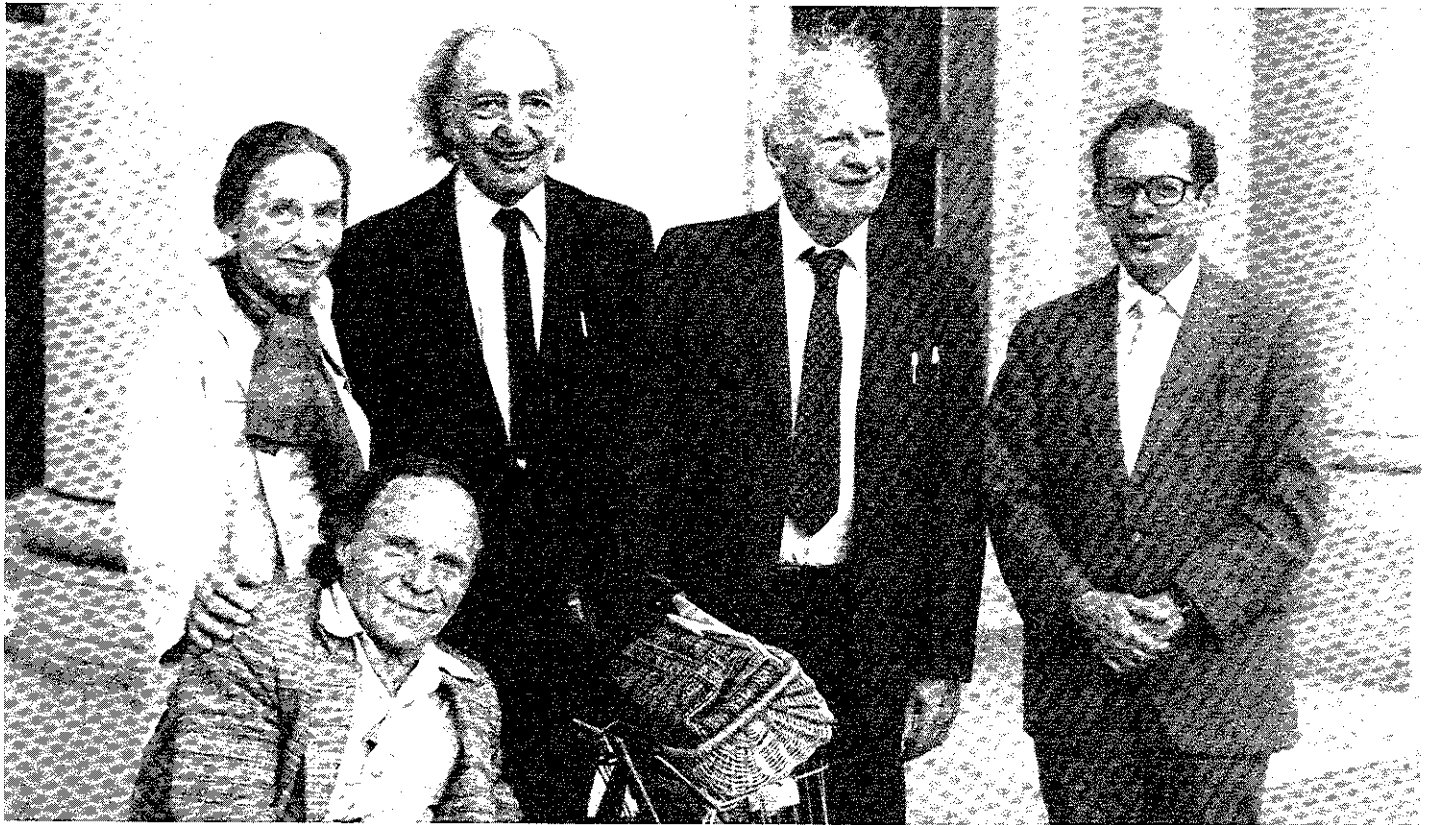
People are very susceptible to the argument that if you go too far in that direction, then sooner or later you're going to create a situation in which the Soviet Union may do something. And so we have to be cautious.

#### Nuclear Freeze

What's people's idea of being cautious? Well, a nuclear freeze. Unlike no first use, unlike nuclear-free Europe, a nuclear freeze is a very cautious step in the direction of moving back—which I believe is the main reason that this idea was so enormously popular and attractive.

What happened to the nuclear freeze movement is that the community of military and arms control analysts who work professionally in this field on a full-time basis, and who are therefore considered to be qualified to give reliable advice to politicians about what's safe and wise did not support the nuclear freeze. Unlike the public, and unlike sort of people in this room, the center of gravity in the professional community is not in the direction of minimum deterrence. It's in the direction of indefinitely perpetuating the status quo.

*(Continued on page 16)*



*Phylis and Philip Morrison, Bernard Feld, Hans Bethe, and Jeremy Stone after Congressional hearing.*

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Therefore, what we have to do to reverse the arms race is change from a situation in which the preponderant view among specialists is that the safest course is to perpetuate the status quo, to a situation in which the preponderant view, or a very strong view, that the safest course is to change what we have been going through for the last forty years.

#### **Reducing the Risk of Conventional War**

The lifesaving alternative is to look at what it would take to reduce the risk of conventional war. And what it would take, very briefly, is to reduce the enormous standing conventional forces of NATO and the Warsaw Pact to small, defensively-oriented forces which are good for national defense, but not for long-range power projection.

The goal of reducing these forces is to end their use for unilateral intervention in smaller countries.

In fact, although nuclear weapons make conventional war unthinkable as a deliberate act of policy, conventional war between the superpowers could still happen although not as a deliberate choice.

This is not good enough. It has to be really out of the question. And to be really out of the question, you've got to get rid of these huge armies and also have internalized constraints on the leadership of the population of these countries along the lines of: "one doesn't use conventional force for any purpose other than defense against aggression". Together, these two factors could make conventional war unthinkable.

Now, my bottom line is, what does this approach offer from the point of view of building a winning consensus compared with the minimum deterrent approach?

It reduces military spending. It reduces the risk of conventional war. By reducing the risk of conventional war, it makes it possible to move to minimum deterrent forces—so you get the benefits of minimum deterrence with a lower risk of conventional war as well.

So you really reduce the risk of nuclear war, and you promote civil liberties and human rights in all of the small countries which no longer suffer from the threat of unilateral intervention of the super powers. You've got four points going for you.

What stands against this approach? There is only one point that stands against it. That is the reluctance of the powerful decision-making elites of the U.S. and Soviet Union to give up military intervention as a tool of power. Many people believe that this one point is enough to throw over this whole alternative.

But this view is the real obstacle to ending and reversing the nuclear arms race. Because the purpose of the nuclear arms race is to ensure that those interventionary tendencies are not practiced by the big powers against each other. And as long as they are practiced against smaller, weaker countries—which cannot fend them off by posing a threat of nuclear escalation—there will be a powerful incentive to perpetuate escalatory nuclear forces on the part of the big powers.

The reason we have failed is that we have not defined the goal in a way which is capable of mobilizing a winning political consensus. The reason it is incapable of pulling

together a winning political consensus is that the idea of widening the firebreak between nuclear and conventional war, is, on balance, not attractive enough for the average person or the average politician against the claim that we want to get rid of conventional war.

#### **An Alternative—**

#### **6 Steps to Reduce the Risk of War**

There is a way of reducing the risk of conventional war that is practicable. It isn't just a pipe dream.

We start with the nuclear freeze basically in order to develop a kind of plateau of stability and detente. This is a gigantic confidence-building measure. It's a signal of good intent on the part of the two superpowers.

We move on next, not to percentage annual reductions or any kind of reductions in nuclear forces—which I believe will continue to fail for the reason they have in the past, but instead, to a nonintervention regime in which the United States and the Soviet Union renounce the whole idea of large scale military intervention in the Third World.

Now, this seems very radical. But in fact it's kind of a marginal loss. There are almost no places left where either superpower could conceivably use military force on a large scale in the Third World. There's Afghanistan. There's Nicaragua. And there's Saudi Arabia. And that's about the whole set of possibilities.

If we got a nuclear freeze and a nonintervention regime, both of which involve no disarmament, we would have created a degree of international stability which is unprecedented in modern history. This would make it possible to undertake some substantial reductions, which I would say should be in nuclear and conventional forces.

And because so many nuclear weapons are out there among the conventional forces, it turns out that if you reduce the conventional forces, you get the nuclear cuts de facto. So, let's say we get something like a fifty percent reduction in the nuclear and conventional forces of NATO and Warsaw Treaty Organization countries, or the big powers, the United States, Britain, France, Germany, the Soviet Union, China and Japan. Those are the ones that



*Willie Higinbotham*



really count, because those countries account for about ninety percent of world weapon production of all types.

If you cut their forces by fifty percent, that would give them a huge surplus stock of tanks, airplanes and ships, which they could mothball. That means they could close down production lines for a while. This would end the trade in conventional weapons to Third World countries, and it would end the technological race in conventional armaments.

Those are concomittants to step three.

### Eastern Europe

Three is another big confidence-building step. So, you've got three confidence-building steps and some reductions. At that point, you can't go any further until you get the Soviet Union out of Eastern Europe. Because as long as the Soviet Union wants to maintain hegemony in Eastern Europe, it needs big conventional forces to do it.

As long as the Soviet Union has big conventional forces in Eastern Europe, there's going to be fear of Soviet aggression in Western Europe. And not only so long as the Soviet Union has the forces, but also as long as it has the inclination to use them in the way that it is using them in Eastern Europe.

As long as that exists, there's going to be fear of Soviet aggression in the West and large western conventional forces. As long as the two sides have these big conventional forces, I believe they will have tactical nuclear weapons and counterforce strategic weapons as a way of ensuring that those large conventional forces are not used against each other.

Many people think that this step is totally impractical, and out of the question; to them I suggest it be viewed as a set of prerequisites.

One has to get the Soviet Union out of Eastern Europe. This is why this message is very heretical. The whole thrust of the scientists' movement, and the arms control community, and even the peace movement, is that first you do the nuclear part, which is the most terrible and threatening, and later we'll worry about the conventional part.

And so, my message is that the last forty years show that while that's wise and logical and good in theory, it's not a winner, politically.

It turns out that this other option has a lot of very attractive aspects—like getting the Soviet Union out of Eastern Europe: If you could get the Soviet Union to withdraw from Eastern Europe unless and until Eastern Europe joined the West and started to rearm, you could further reduce these large conventional forces of these countries, let's say down to ten percent of their present size.

At that point, you would have to dissolve the military alliances, because the United States couldn't really sustain its support of the conventional defense of Western Europe through a big Navy and long-range Air Force.

In fact, these cuts would go beyond shrinking to reconfiguring the conventional forces of these countries so that they would become purely defensive: border guards, anti-aircraft, anti-tank, coastal defenses and anti-ship implaced guns all of which cannot go anywhere and attack anyone but can do a very good job of defending one's border.

### Minimum Deterrence

The only nuclear weapons that would be left would be back to minimum deterrence. Now, one could reduce to ten percent or less of the current nuclear arsenals. Indeed, I think that if you lived in a regime like that for a couple of decades, you could get rid of nuclear weapons altogether.

The failure of the movement is that we are not defining a goal which can command a winning consensus, and this is going to continue to be true. Rather than continuing to look at strictly nuclear arms control measures, and how to fend off strategic defense, we should start looking at what perpetuates the risk of conventional war which the nuclear forces are ostensibly there to respond to. It's the interventionary use of conventional force.

DR. STONE: During the break someone made critical remarks about Randy's speech. I responded by telling him of complaints I once made in Libya to persons working for Quadafi. They said: "But you have to understand that he's a revolutionary. Naturally he says such things. You shouldn't judge him the way you judge others."

Now, Randy is a successful revolutionary, and we should understand the six revolutions that she's proposed here in that light, applauding the intellectual brainstorming, if not the breakthroughs, that it represents.

But we will repeat the past if we don't fully understand it. Therefore I was appalled to see how differently Randy and I view the motivations of these arms controllers who didn't respond favorably to the freeze. In this difference lies an analysis of the flaws in her revolutions.

I say this as a representative of an organization (FAS) that gave as much credence, support and enthusiasm to the freeze as any group of arms controllers, as Randy has recognized in her testimony.

The problem was not that the other arms controllers wanted to maintain the status quo. It lay instead in their judgment of what was possible.

And the reason that the usual arms controllers didn't think the freeze was possible was, in the first place,

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Len Ackland



Ruth Adams

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perhaps, because they were right. Randy, you, yourself, have characterized it, I think prematurely, as a failure. Perhaps they were right, that it wasn't possible; too complicated to be done so quickly.

In any case, they viewed what was possible in the context of the status quo political situation. You had the advantage, Randy, in viewing the possible in the light of your own vision of what an aroused public might achieve if it were aroused to change the political status quo.

You saw the freeze as a way to command a consensus that could then command further progress.

It is ironic now that you're talking about even more far-reaching goals, as a way to command a much larger consensus that could then achieve those bigger goals when the freeze itself—a less dramatic step and only one in this series—couldn't command the consensus to be itself achieved.

Finally, I don't think we should underestimate what has been achieved or can be achieved by agreements that fall very short of minimum deterrence. This whole arms control process is largely a political exercise between the two sides, that can change the probability of war, by changing the nature of the relations between the two sides.

So, I do not think that our whole movement is about getting down to minimum deterrence. Neither of the two major treaties achieved thus far were about that at all!

DR. GARWIN: Randy may characterize correctly the arms experts' response as that centrist view, but the independent arms controllers are heavily biased toward minimum deterrence.

Enormous reductions in numbers of nuclear weapons are not essential to reducing the probability of nuclear war. Stopping building them, and taking out the ones that are mixed with the forces, would all be useful.

This is not to make the world safe from a conventional war, because conventional war could be responded to by strategic weapons. You don't need battlefield-based nuclear weapons to have battlefield explosions.

My big reason for quick and massive reduction in

nuclear weapons is to introduce a nonproliferation regime where our nuclear weapon people and Soviet nuclear weapon people are fiercely opposed to the acquisition of nuclear weapons by any other country.

Furthermore, it will only work to have massive reductions if the three other nuclear powers, the French, the British and the Chinese, will commit to our reduction to a considerably smaller stockpile, three hundred or so.

Your point is that we cannot get these massive reductions because we cannot get a consensus toward them.

MS. FORSBERG: If we get a reasonable degree of honesty and argument and demand that the government provide intelligent and solid arguments in response, perhaps we can get that consensus. And so, for ten or twenty or thirty years we will have a stable situation at a level of a few thousand nuclear weapons which will give us time to think more.

#### Alternative to Arms Control

You both seem to think that I'm proposing my six steps as an alternative to minimum deterrence. I'm proposing the six steps as an alternative to ordinary arms control, because ordinary arms control has been unsuccessful in stopping the technological race.

My analysis of why it has failed is that the majority of people in the decision-making elite think what you both just said, that we are going to be living in a world with very large numbers of nuclear weapons for the foreseeable future.

And in such a world, the majority thinks, perhaps, unlike the two of you, what's the point of having a nuclear test ban, or really going in for very devastating kinds of constraints? We can continue to perpetuate this triad which offers a wide range of nuclear war fighting options.

My response is that your marginal steps keep failing because the only place to which they could lead is minimum deterrence in the long run. Everybody who doesn't want to go to minimum deterrence in the long run won't even bother to take the first step, which was also true of the freeze.

DR. GARWIN: I certainly don't want to preserve the triad, particularly, or war fighting capabilities. I don't understand why I am so misunderstood in this regard.

#### Extended Deterrence

DR. VON HIPPEL: The arms control community really does think of the connection between the conventional and the nuclear arms race. It's called extended deterrence in the jargon.

But if you study closely the rationales which are given for weapons systems in the Armed Services Committees, you find statements such as "we need the MX because we have to hold the Soviet missile silos at risk, and unless we hold the Soviet missile silos at risk, the Soviets will be more adventurous around the world."

It's because we haven't really understood this, that we have been treating the nuclear arms race as a separate subject. I happen to think that we can deal with the nuclear arms race, to a large extent, if we can get the public to understand that in fact minimum deterrence will work at much lower levels of nuclear armament.

If the public understands that this is a large part of what

drives the arms race, in fact the public will say we don't need it.

### The Arms Race and Reagan

**DR. WOLFE:** I want to congratulate Randy on what she achieved in terms of the nuclear freeze campaign and to say why I think it failed.

It is that the President and his advisors were so definitely anxious to carry on the nuclear arms race in the hope of gaining a decisive superiority over the Soviet Union.

I think this is what Richard Perle has been pushing for and why he will use every wile at his disposal to make sure we don't have any significant agreement on nuclear weapons reductions, and so on. They want to go ahead with the nuclear arms race. But we came awfully close to winning the freeze and we ought to try it again.

**MS. FORSBERG:** The public at large can only be moved by big brush strokes. Arms control isn't big enough. If all you're going to offer them is arms control, they're going to leave it to the decision-making elite.

Now, if we're talking about something serious like stopping the production of all nuclear weapons, that will mobilize people. But then the decision-making elite has to respond to this opportunity and demand by saying, "Yes, this is something serious and important."

### Widening the Weapons Debate

**MS. ADAMS:** I want to thank Randy. I thought that was a splendid analysis. I get troubled about arms control and I try to articulate some of my concerns, and she did some of them beautifully for me.

We agreed this morning that we really didn't have a weapons problem, per se, but a political problem, and yet we still seem to be talking about weapons and more or less of them.

And I think that we're never going to get anywhere unless we can broaden our concerns and the debate. Let me just take Randy's steps as an example.

As long as you attach a bilateral condition to that first big confidence-building step [i.e. the freeze], you're turning over your proposal to traditional arms controllers and negotiators, and I think you must remember that.

Secondly, if you talk about nonintervention in the Third World, that doesn't mean that you're going to forsake the Third World in terms of new international institutions, new ways of looking at trade, resources, development and so on.

And somehow we've got to interject the fact that we are concerned about social, political and economic changes in the world in order to make a realistic agreement with the Soviet Union on nonintervention.

The only point I'm making is that let's not keep weapons only on the table. Let's remember you won't accomplish anything in controlling these weapons unless you solve these other problems.

**DR. HIGINBOTHAM:** I feel we're getting sort of broadened out here. We could try to reduce the birth rate, too.

Number one is the nuclear thing, and I look back through this, and as Bob Wilson and Hans Bethe and others have said, "what happened?" Well, we won some

battles, we lost some battles. But I look back at this, and I think one time when I felt the most encouraged was about three or four years ago, when the freeze movement came on.

It gave me some feeling of encouragement that at long last not just the scientists from Los Alamos or Oak Ridge or Argonne or Hugh Wolfe from New York City, or whatever, were involved. But for once you got a whole pile of interested people going out and putting it on the ballots and getting people to vote.

When one looks at the preintellectual stage of the development of physics, one sees that practically all of it begins with people interested in the nature of decorative objects. And all of solid-state physics, at least, has this history in the making of things.

Our present problem comes from the fact that quite a long time ago uranium was used in the decorative arts. Becquerel knew that uranium glass had a very curious quality of fluorescence, and the moment that Roentgen announced the discovery of x-rays, he thought: "fluorescence, aha, there's something interesting in this other material which seems to fluoresce almost naturally without a cathode ray tube."

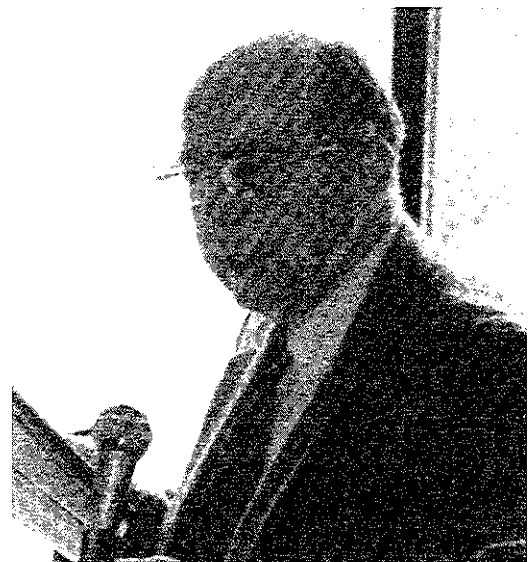
That's the beginning of the whole nuclear industry, for good or ill.

Another thing that comes out of the history of science, the early arguments on whether atoms existed or not, the medieval arguments between Aristotelianism and atomism were settled in favor of the atom, the indivisible atom—rather like the one nation, indivisible.

In other words, the sovereign nation has become just as obsolete as the indivisible atom. And this doesn't come about because people know what they're doing. It comes about because people feel there is something interesting in a certain area.

### Popular Change

This brings me to the only real comment I can make about this, and this is that there's only one thing that can nucleate phase changes on the scale of the nuclear weapon,  
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Hugh Wolfe

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the transformation of the nucleus or the transformation on larger scale, and that's the transformation in men's minds.

Curiously, it's much more subtle. Yet in the long run it's much more powerful than any. I can't help but feel that somehow we ought to encourage artists and poets to worry about these things. I would like to see some of the great foundations propose fellowships rather like the Guggenheim fellowships, which have the wonderful quality of freedom of not having to write reports and this kind of thing. I could see that a poet could write a short poem that would really change people's minds throughout the world. I really believe this.

I think that in addition to the fellowship idea, it might be feasible actually to go back to the old idea of having substantial prizes for doing useful intellectual things. Completely impractical, but maybe not.

On one of Randy's points about the retreat of the U.S.S.R. from the smaller nations bordering between Western Europe and Russia, one has to remember the Russian viewpoint. Every trip that I've made to Russia since the 1950s has been one in which one or more of the scientists that I've been working with has taken me outside of Moscow to show me how close the Germans got to Moscow during World War II and reminding me of Napoleon and pointing out that never again must Russia be caught with a situation where they can ever be invaded to that extent.

Similarly, in Leningrad you face the fact that there were approximately two million people who died either directly from the war or due to starvation. And there is this feeling. You might call it paranoia, but it's something that's totally foreign to, of course, our side, the United States.

We don't have the same. So, that's one aspect in the building of confidence that we have to look into that has a very, very complex character that we can't quite handle or judge ourselves.

Now, I firmly believe, and this is a point that Bob Wilson raised, that it's essential for the U.S. scientists to keep an open door to discussions with their Soviet colleagues and to attempt every effort wherever possible on a basis that's of mutual benefit to try to establish plans and relationships that will help build confidence first in the sciences and then in the way we do science. And, thereby, at least broaden the base for any future possibilities of carrying into more serious matters in terms of the negotiations that we've been talking about today.

MR. PAINE: It seems to me that the logic of your proposal, Randy, is the one made by Eugene Rostow in his confirmation hearings: that you couldn't have much progress in arms control until you had universal acknowledgment of the United Nations charter.

It seems to me if you're going to really accept the logic of your proposal, that there is no real separation between nuclear and conventional forces, you wouldn't start with the nuclear freeze. You'd start with your noninterventional, or reductions in conventional forces, and eventually you might get to a nuclear freeze later.

### Scientists and the Public

MS. FORSBERG: Very briefly, this proposal is designed to crystallize the good reasons for the perpetuation of the use of force, and show people how, if you just stick to the good reasons, you might want to have forces around, we can eventually get rid of all of it.

I want to go back to the relationship between the scientists' movement and the general public. One of the reasons that the public has not responded more actively to the Star Wars problem is that, compared with working on the freeze, working to prevent Star Wars is a real setback.

People have a feeling that it amounts to almost less than holding the line. And what a come-down that is from thinking that you are going to have a chance to stop the nuclear arms race.

This leads me to comment on this enormous difference in style between Jeremy and me.

Jeremy's style is one of waiting for breaks to arise, seizing the moment, working incrementally, and not being too optimistic about how fast we are going to get how far is a necessary part of the process. Someone must be sitting in Washington who can come in and strike when the iron is hot.

However, this is not helpful for mobilizing the public. It is just what the public doesn't need. To be mobilized, people have to have a sense of hope that something that they can see—something that is big enough and worthwhile enough to make them feel like the world is changing for the better—is worth their working three nights a week, and going to meetings every Saturday, and canvassing door to door, and doing all those things which are terribly hard, and energy draining, and are frequently depressing, because you don't think you are going to win.

It is not enough to just wait for the opportunities. If you want to have the public be part of the process, and if you feel that part of the process on political change is the mobilization of public opinion, you have to take into account that people have to be offered a structure on which to pin their hopes, a goal to work for that is worth the real pain in the neck it is to work and be an activist.



Alice and Cyril Smith

So, I want to urge people in the Federation to think about these themes of giving people something to hope for, taking the initiative and doing the dirty work that is tedious and not that rewarding, but where even scientists can play a special role.

#### FAS and the Freeze

DR. STONE: With regard to the freeze movement, FAS played exactly the role that Randy is describing.

As she will recall, the Federation in general, myself in particular, linked the freeze movement to the Hill when the moment was right and, in so doing, advanced its timetable by three years; we were delighted to seize the opportunity.

It is likewise true that we had not manufactured an idea, and merchandised it, to capture the public imagination to the extent Randy did.

And in thinking back on why we are not more optimistic about such efforts and do not spend more time on this than we do, it occurs to me that none of the three previous uprisings before yours, Randy, were invented.

One came through the creation of the atom bomb itself and the May-Johnson bill. The second one arose from the public's awareness that mothers' milk was being polluted; mothers were led into the streets by a scientist, Linus Pauling, but the uprising could not have occurred without atmospheric pollution.

The ABM controversy reached its height because of "bombs in the back yard." Even though those bombs might not have been dangerous in those back yards, it was just like a reactor in one's back yard that led the public to rise up.

The only time we have seen a public uprising that was test-marketed, then marketed, then a whole movement generated, was the freeze movement. This was an effort to actually design something that would capture the public imagination.

The present fortunes of the freeze are such as to raise the question, can anything really new be so designed that it so captures a consensus able to resist the momentum, the mad momentum that we often talk about? It remains to be shown that that can be done.

MS. FORSBERG: Let me take this opportunity to confirm that Jeremy's work with Kennedy essentially doubled the size of the freeze movement in the space of about two months, by getting it in front of the Congress and bringing together Congressional supporters, which in turn got us the national media that let a lot of people know about the freeze that wouldn't have known about it otherwise—which shows the enormous power of that kind of leverage when it is used effectively.

He is completely right also that it is not obvious that people can succeed in generating a movement. On the other hand, the reason I am most proud of the freeze is that this was the first large peacetime peace movement where the people involved did not have a sense of personal injury.

But Star Wars has the qualities of the ABM. It is a vast waste of money on something that isn't going to work. It is a real hollow man, a real emperor's new clothes. It doesn't have some of the qualities of offensive nuclear weapons



*Jeremy Stone*

yesterday, that seem to actually do something useful for you. This, we know, doesn't do anything useful.

So in spite of agreeing with Jeremy's general thesis, Star Wars may be a special case where a concerted large-scale movement is possible. If you could get together a critical mass of scientists and engineers who were convinced that this was a total waste, and who were willing to spend a good deal of their free time, and some of their work time, for one to two years, I think you could really turn it off.

And that victory might be the kind of victory that people in the activist and peace movement are always talking about.

DR. GARWIN: I have been speaking a couple of times a week to groups as diverse as the Naval War College, World Affairs Council in Tulsa, a Wichita State University symposium, Rockefeller University, and debating Pete Warden of the SDI office last Thursday.

And at all these places, except the Naval War College, the people end up persuaded, but they say, what can we do about this, and I have very little to tell them. I tell them they ought to write their Congressmen, they ought to demand that their Representatives and Senators find out both arguments for and against these things. It would be very helpful if there were a clear statement of what people could do.

#### Star Wars-Need for Communication

We need better communication, so that we can work together on topics of current interest—sometimes even just to forward a particularly telling argument or piece of information from one of the many organizations to another.

So one thing which is required is the ability to find people at a moment's notice who can be organized into an effective task force on this or that, and there I think the Federation could play a role, could be a central clearing-house.

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John Holdren

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People write me and say, how can I help, people at Livermore, business people in Silicon Valley, and I really can't sustain these communications. There ought to be a way to contact those people, keep them informed, not necessarily by electronic mail. There has to be an editor involved.

You can't send them all the stuff, but if we produce something which is of interest in the Star Wars field or on the MX, then send it out to those people who want to know—so when they talk to their local communities as scientists they can be sure that they have the latest reliable information months before it could get published in the Bulletin (and the Bulletin wouldn't take it anyhow, because it might be too scientific, too specific, too narrow in focus).

MS. SHAPLEY: I was struck with Randy's comment before the break that it looked as though SDI could be refashioned and packaged into some kind of a cause that might in fact be capable of striking the public imagination. I think as she thinks, that this is something that everyone else in this room ought think about very, very carefully, because I think she knows a great deal about what the public is likely to respond to and how such ideas can be marketed.

I was also most impressed with the apparent symbiosis that Jeremy and the FAS have had with the public movement on the freeze in the past, and it leads me to speculate that if we were to hold another such meeting in ten years' time, on the fiftieth anniversary, and have a similar introspective session as yesterday on the successes and triumphs of the past, whether it would not be very fulfilling to be able to look back on the defeat of SDI as one of the triumphs of the previous decade.

And I wondered whether there might be some possibilities for symbiosis, that namely Dick, Jeremy, and Randy could talk and see what the possibilities might be for some kind of mutual interaction that could lead to a fruitful effort.

### Percentage Annual Reductions

DR. STONE: Many of you know, maybe a third of the audience knows that we are proposing both in Moscow and in Washington a solution to the general crisis of Star Wars and disarmament that is simple, and could capture in principle the public imagination, and which is discussed in the April issue of the Public Interest Report that talks about bear hugs.

What we are proposing is percentage reductions of the limits and sublimits of SALT II for an indefinite duration.

This was a Federation idea which we sold the Pentagon in 1979, and which Jimmy Carter later secretly proposed at the '79 summit to Leonid Brezhnev. Later the Senate Foreign Relations Committee unanimously endorsed it. Under this new formulation as we are now extending it to deal with Star Wars, there would be an agreement of indefinite duration shrinking the limits and sublimits of SALT II by a fixed percentage per year, leading to asymptotic reductions that would go asymptotically to zero.

If we thus began on the disarmament road, with tangible and visible reductions taking place, the political climate would be such that all would be extremely reluctant to start on the Star Wars road—because it would be obvious that the dismantlement would stop if the Star Wars deployment breached the provisions of the ABM Treaty. Therefore, disarmament could hold Star Wars hostage.

This simplest of all possible reduction agreements, requiring the two sides to agree only on a single number, would be superimposed on what both agree was the fairest balance that could be worked out over seven years.

This approach was well received, I think, albeit in rather spirited discussions, in Moscow, even though the outrage there about Star Wars is running very high, and in briefings on return to the US, we found a real opening here.

MS. FORSBERG: The world I see 50 years from now is a world in which many countries have nuclear weapons, let's say several dozen, in which many countries have independent defense industries, in which the frequency of war is declining, and the risk of catastrophe is rising, in which enormous quantities of resources continue to be poured into weapons which are never used by more and more countries, resources that we need and could well use for other purposes.

I think that the human race is on a path toward ending war, and we are doing so in an extremely dangerous and wasteful way, and the question is, can we hurry that process along a little bit by trying to? Can we point out to people that the inevitable consequence of the spread of nuclear weapons is that war will be possible in fewer and fewer parts of the world, and it might be nice to make it impossible in fewer parts of the world without the spread of nuclear weapons.

I don't know if it will be possible, but I think that beginning to talk explicitly and publicly about the tendency of the superpowers to use conventional force in Third World countries and Eastern Europe, as being the lynchpin of the armaments problem on a global scale, certainly cannot hurt.

It can't hurt to think about the problem as a large, com-

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# FAS-BAS RETREAT MAY 12, 1985—JOINT COMMUNIQUE

## REDUCING THE DANGER OF NUCLEAR WAR: WHAT SCIENTISTS AND CITIZENS HAVE DONE AND CAN DO

Within a few months of the destruction of Hiroshima and Nagasaki by nuclear bombs in August 1945, two groups of the American scientists who had participated in the development of those weapons founded independent organizations dedicated to reducing the danger that such weapons would ever be used again. One of these organizations, the *Bulletin of the Atomic Scientists*, established offices near the University of Chicago site where Enrico Fermi and his associates had achieved the first self-sustaining chain reaction; the aim of the *Bulletin* was to communicate information and informed opinion about military and civilian uses of nuclear energy to an audience not restricted to specialists in these matters. The other organization, the Federation of Atomic Scientists (soon to become the Federation of American Scientists), had its headquarters in Washington, DC as befitted its primary mission of decision-maker education and lobbying. Its first campaign—to secure defeat of a bill that would have left postwar control of nuclear energy in military rather than civilian hands—was a success; this auspicious beginning was duly reported in an early edition of the *Bulletin*.

On May 10-12, 1985, surviving founders of the Federation of American Scientists and the *Bulletin of the Atomic Scientists* met at Airlie House, Virginia, to celebrate the fortieth anniversary of these two organizations with other scientists and citizens who have joined and continued their efforts over the intervening decades. The participants included members of the Board of directors and Board of Editors of the *Bulletin* and Sponsors and members of the elected Council of the Federation. It was an occasion for review of the successes and failures of forty years of working to reduce the nuclear danger, and for discussion of the challenges that face us in 1985 and the years ahead.

Already in 1945, the atomic scientists of conscience who founded the FAS and the *Bulletin* had agreed on three crucial conclusions about nuclear weapons; there is no "secret" (meaning that the capability to build such weapons soon would spread); there is no defense (some penetration of any defense is inevitable, but none is tolerable); and, given the first two conclusions, international cooperation to control these weapons is essential. The advent in the early 1950s of fusion weapons a thousand times more powerful than the original fission bombs only strengthened these conclusions. Nothing has happened since to weaken them.

The dangers foreseen by the original atomic scientists as they tried in 1945 to anticipate the problems ahead were also three in number: the chance that a nuclear war actually would occur; the possibility of proliferation of nuclear weapons to a large number of nations; and the danger of a nuclear arms race leading to very large arsenals in the possession of the major powers. With respect to the first two dangers, the four decades since 1945 have been kinder than many feared. There has been no nuclear war, thanks to restraint by national leaders (helped along, we like to think, by some success of scientists' efforts to communicate to decision makers and publics the dangers of these weapons) and thanks in part, we suspect, to good luck. And proliferation of nuclear weapons to additional countries has been slower than it might have been: instead of dozens of nuclear-weapons states in 1985, as some predicted, only six countries are known to have tested nuclear weapons and no more than two or three others are likely to possess small numbers of them untested; the 1968 Non-Proliferation Treaty has been an important help.

The nuclear arms race between the United States and the Soviet Union, however, has proven to be much worse than anyone supposed in 1945. Where pessimists of that time foresaw hundreds of nuclear weapons on each side, there are today tens of thousands; and no one

could have foreseen the perverse diversity of types of nuclear explosives and delivery systems that four decades of weapons research and development have now produced. With a few exceptions—most importantly the Partial Test Ban Treaty of 1963 and the ABM Treaty of 1972—the attempt to control the nuclear arms race has been a gigantic failure.

In 1985, the prospect of the continuation and expansion of this historical failure to contain the superpower arms race has some particularly troublesome dimensions. First, ongoing and impending deployments, by both sides, of offensive counterforce weapons (those with characteristics suited to pre-emptive attacks on the retaliatory capability of the adversary) build fear and mistrust, erode the margins of invulnerability on which crisis stability depends, and promote an action-reaction spiral in which the arsenals grow without limit. Second, pursuit of "star wars" strategic defenses toward the testing stage threatens not only to generate an expensive new competition in space weapons but also to provoke unconstrained build-ups of land-based and sea-based offensive nuclear forces to counter the prospective defenses; moving to the *deployment* of such (inevitably leaky) defenses, moreover, would decrease crisis stability because a leaky defense is more effective against the retaliation of a wounded adversary than against a powerful first strike. Finally, the continuing failure of the superpowers to stop and reverse their own nuclear arms race is adding to the incentives for other nuclear powers to expand their arsenals and undermining the Non-Proliferation Treaty.

The scientists and citizens meeting at Airlie House for the 40th anniversary of the FAS and the *Bulletin* came with a variety of concerns and priorities, but we were able to agree on many of the ingredients of a program for doing better at reducing the nuclear danger in the years ahead. A ban on all testing of space weapons would preserve the possibility of averting an arms race in that arena and the reactions to it in others. A ban on flight tests of new ballistic missiles would terminate counterproductive trends in the main class of offensive counterforce weapons. Continued adherence to SALT II limits would provide a needed lid on strategic nuclear forces overall, as well as a framework for starting the process of reductions. A comprehensive ban on the testing of nuclear explosives (CTB) would help dispose of the illusion that nuclear weapons have some use other than deterrence (for which those that already exist are more than adequate) and would reinforce the nonproliferation regime. Pursuing less threatening postures for conventional forces would reduce the risk of conventional as well as nuclear war. And restoring and expanding US-Soviet collaboration in such areas of mutual interest as new energy technologies, environmental science, and peaceful uses of space would make at least a modest contribution toward reducing the confrontational character of the relationship.

We emphasize, finally, that the nuclear danger is a political problem more than a technical one. It should be no surprise, then, that the main arms-control accomplishments of the last forty years—the partial Test Ban and the ABM treaty—were achieved in periods when an aroused and informed public helped pressure political leaders into action. If we are to do better in the years ahead, the intense public concern of the early eighties must be sustained and translated into persistent pressure for comprehensive results. Settling for too little must be avoided, and that will require a deeper understanding of the issues than ever before by publics and decision makers alike, more ingenious proposals, and a higher level of intelligent debate. The Federation of American Scientists and the *Bulletin of the Atomic Scientists* each will continue to work to help create those conditions.

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plex, interrelated problem which does admit of a logical solution, and to point out to people that there are alternatives. If we wait for opportunities, and even if we make the most of them as they come along, it is not going to lead to a decline by 50 or 75 or 90 percent in the stock of nuclear weapons during the next 30 years. It is going to lead, instead, to a slow but steady increase, and the spread of these weapons to more and more countries.

So, even though I realize I presented my program with a necessity, grandeur, brightness, and kind of self-righteousness that is very inappropriate, I defend the notion of people trying to think through policy choices which are being made, one way or the other, de facto.

DR. STONE: Well, it goes without saying that the importance of being ready to seize the moment doesn't mean we should only seize the moment. Almost everybody in this room is a veteran of a campaign far longer than the freeze campaign—a ten-year campaign to establish in the public mind an idea even more revolutionary than that of stopping the arms race, namely, that both should agree not to build defenses against the other side's ballistic missiles.

So, we are all campaigners around the table, tried and true campaigners in long campaigns. It is obvious also that all of our schemes are drafted with an eye to capturing public attention and trying to see if we can get public support.

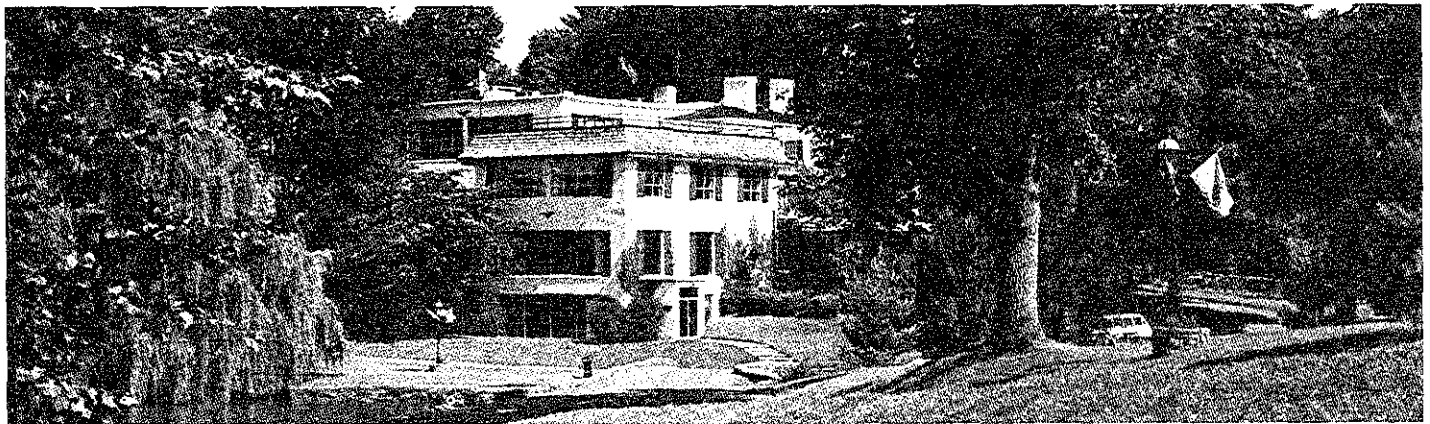
So, I don't think that scientists can be portrayed as in-

sufficiently interested in whomping up revolutions. But it is simply a statistical fact that the social perturbations, and the human tides, that we might seize upon when we seize the moment, are not likely to be ones we ourselves stimulate and this means we must be prepared to seize moments created by others or by events.

Also, I don't think that criticisms of a grand design should be interpreted as criticisms of having a grand design. But grand designs are hard to do, and the grander they are, the harder to do. Back to the drawing board doesn't mean throw out the drawing board. It can just mean that we didn't like this first draft.

It is a very human world out there—even in here, as many elements of this conference showed. There are only people out there. And all these societies are structured in very different ways, with insufficient awareness, in both superpowers, of how differently the other is organized. And much of this is a societal problem, never to be ultimately resolved, with countries whose relations go back and forth like pendulums. When they get far enough away, the fear of war drives them closer. When they get close enough they find that they don't really like each other, and they retreat—not unlike relations between people in similar situations.

So there is a limit in the end to what can be done, even nuclear weapons aside, in bringing these two superpowers into some better relationship. But obviously we can do a lot better than we have done so far.



Airlie House, Virginia

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