

## **Post-Hiroshima Campaigns by Scientists to Prevent the Future Use of Nuclear Weapons**

**Sir Joseph Rotblat**

Thank you, Natalie, a very moving introduction. I am going to spend the rest of my time just going over the pieces that were left out. I am very honored, indeed, to have been given this task of starting this very important seminar, which is beginning tomorrow.

Nuclear weapons and their various aspects are a very important topic just now. I think nuclear weapons, as a realm of weapons of mass destruction, is a topic which occurs now very frequently and is seen in two ways, two different approaches. In one sense, [there is] a press for detail in full about weapons of mass destruction referring to a non-event, an event in which they did not play an important role. On the other hand, they hardly make any objection to the real dangers of a nuclear war, and nuclear arms race, which resulted from the policies made by the present administration. The best example is the events in Iraq. There are now very few people who really believe that the reason given for starting the war was valid, from the point-of-view of the law. The other example, of course, is the new policy of the Bush Administration, which is completely radical and has changed the whole approach to the problem of humanitarians and the use of nuclear weapons—something very few people know about. These are the reasons why I feel your seminar is so important—because it tackles these many aspects. I am glad to see, among the audience here, a few of my old friends—a few of the speakers who, I am sure, you will hear a great deal from in the next few days.

My task tonight is to give a general overview of the whole problem of nuclear weapons, problems of history and form an introduction, which includes my whole role in it. You remember that the atom bomb was the invention of scientists, who began the work on the atom bomb at their own volition. Nobody asked them to do this. In this case we ask the question—why? It is not usually the job of a university professor to work on weapons of mass destruction—it does not enter into his job description. Therefore, why did scientists do this? Why did they initiate this work?

I think this question applies particularly to me, which is the reason why I am going to use myself as a model here, because I consider myself, as indicated in the introduction, as being a humanitarian scientist. By this I mean that while the main task of the scientist is to search for the truth, he must also remember the other citizen—members of the community. We must never do anything which could bring harm to society. This has been my principle from the very beginning, even before I became a scientist myself. In that case, you may ask, why did I do this job? Back in November 1939, soon after the outbreak of World War II, I went to James Chadwick, who was the man in charge of the University of Liverpool, in England, at the time. I suggested to him that we begin on the scientific feasibility of the atom bomb. How did this come about?

Well, that is a chronicle of history, a mere coincidence that the vital discovery that would open the way to the atom bomb occurred shortly before the outbreak of World War II—a war between democracy and the worst type of total imperialism. At that time, I was exploring a problem and doing some experiments on the discovery of uranium. When I read this paper on the discovery of fission, something occurred to me that I should check, and so I carried out an experiment. What I found, indeed, mainly opened the way to a nuclear weapon. I had to act very quickly. As I did this latest observation, the same observation was made simultaneously and independently in several other laboratories, because this is how science works—a theory, which is right will emerge to a number of people.

In my case, it coincided with one of the worst periods of my life. As I said, I believe that science should hold up the good, for the benefit of mankind. The idea of working on weapons of mass destruction certainly did not enter my mind—it was not the way I saw scientific inquiry. Therefore, when I saw this slight possibility, my first reaction was to push it out of my mind. All night, I thought about the extents to which the discovery would impact science and others.

However, no matter how much I tried to push [the idea] out of my mind, it did not work. In the back of my mind, a fear kept coming up—a fear that other scientists would not have the same moral scruples regarding the atom bomb. When I thought about the other scientists, I had the German scientists particularly in mind because the work on fission, the chemical aspect of it, was carried out in Germany. Though many of their best scientists had been lost to Nazism or had left Germany, there were enough good physicists left in Germany who would have the same idea, and carry out the research.

Therefore, I was afraid that if Hitler acquired the bomb, he would use it against us to win the war, because, coming from Poland, I already knew that the war was going to come very soon. This was the state of my mind which utterly placed me in the belief that the situation was extreme. On one hand, I said my ideas of science are against working with weapons of mass destruction, against any weapons. On the other hand, this very idea of science would be eradicated if Hitler had the bomb and then went to war—then democracy would be doomed. This was my problem in December 1939.

Eventually, as often happens, the immediate danger took over. The outbreak of the war, in September 1939, started with the invasion of my native country of Poland. Within a few weeks Poland was overrun, the military might of Germany was soon revealed. I thought if Germany were to acquire the atom bomb, in addition to these conventional arms, then I was afraid that democracy would be doomed. I could not accept this, which is the reason why I decided that I wanted to go to Chadwick, and suggested to him that we start the work on the atom bomb.

But in doing this, I still kept in mind my moral scruples. In fact, I used this rationale for starting the work on the atom bomb. My thinking at that time was that if the bomb could be made, and Hitler acquired it, then the only way you could prevent Hitler from using it against us would be if we also had the bomb and threatened retaliation. In other words, the idea of nuclear deterrence. I developed this concept of nuclear deterrence in December 1939, and used it as the reason why

we should start the work.

Later, I found out that my colleagues in other places in the Europe, who later joined together to do this research, had the same idea that we needed the bomb—not to be used, and I put stress on this. We decided to work on the bomb not so that it should be used, not even in Germany, but to prevent its use—to prevent its use by Hitler. This was the idea of why we started our work. If this was our concern, then of course, we should begin as quickly as possible and make the bomb before the Germans would acquire the bomb, otherwise we would lose the element. Of course, we did not know at the time that Germany actually did start its bomb project about the same time that we did in England, in 1939-1940. But for a variety of reasons, including some wrong calculations with an experiment, some German scientists came to the conclusion that [the bomb] would not work. The bomb would have to weigh something like a ton, therefore it was not a feasible weapon. For that reason, they gave up the whole project in 1942, even before the Manhattan Project began in earnest in the US. But we did not know about this at the time—we did not learn this until much later. Consequently, we began [our work] on the atom bomb.

Later on, I came to realize that my argument of nuclear deterrence was closed, which is eventually why I believed nuclear deterrence would not work. One of the reasons is that it only works if you deal with rational people, people who think rationally. If I tell you, Natalie, do this, if you decide to do this, if you are a rational person, then of course you will insist on doing it. But Hitler was not a rational person. I feel now—I am almost convinced, although I cannot prove it—that if the situation was as it appeared, that Hitler had the atom bomb, then the last order from Hitler, from his bunker in April 1945, would have been to use the bomb on London even though he knew this would cause effects on Germany. This [action] would have been in line with his whole philosophy. But of course, as I said, this idea came to me later. I was not wise enough at the beginning and, therefore, this is why I worked on the bomb.

As it happened, this thesis, as I just talked to you about Hitler using the bomb this way, will never be put to the test because Hitler was defeated before the atom bomb was ready—was made. He was defeated with conventional means. Now that this reason for making the bomb was gone, there was no reason for the project to continue. However, it did continue. In fact, it increased in its momentum because it became a matter of urgency to finish the bomb and to use it against Japan. Eventually it was used—it was made and was used to bomb two Japanese cities—and this brought World War II to a dramatic end.

Now there are many versions, if you read the historical literature of the time, you will find that many reasons are given for the reason why the American Government decided to use the bomb on populated cities. Obviously, the reason I have mentioned, of hastening to bring the war to a rapid end, and in this way save many American lives—even though many Japanese lives were lost in the process—was a very important reason—no doubt this played a very important role. But I admit to you that there were other reasons as well. One of the other reasons was to demonstrate to the world, particularly to the Soviet Union, who were our allies at the time, but nonetheless ideologically different, to demonstrate to them the nuclear possibility and the known military might of the United States. I think there is evidence for this. For example, the Secretary of State at that time, James Byrnes said, “Our positioning and demonstrating the bomb will make

Russia more manageable.” More direct evidence came from the man who directed the Manhattan Project. You see here on the right General Leslie Groves, who was the overall director of the Manhattan Project. Here he is shaking hands with the man I mentioned before, James Chadwick, the scientist who was my boss and the leader of the British team working on the atom bomb. What Leslie Groves said much later, though I knew about it in 1944, he testified, and this is published, “There was never a doubt, from about two weeks from the time I took charge of the this project, for any reason on my part that Russia was the enemy, the project was conducted on that basis.” This is one of the reasons, I think, of why they had decided to go ahead and to use the bomb against Japan. Many scientists, during the time when they still worked on the Manhattan Project, were very much against this use of the atom bomb. Among them, one of the most vocal and eminent was Niels Bohr. He was involved in this project, it is a long story about how he became involved, but he came to Los Alamos, the place in New Mexico where the laboratory for the bomb was built. He had an idea—he saw what was going to happen. He foretold that if we went along with the plan, as I mentioned before, if America used the bomb to end the war, Russia would not accept America’s superiority and success. Russia would say, “Oh yes, I accept America’s superiority,” but then try to acquire the bomb itself.

Subsequently, [Niels Bohr] foresaw the nuclear arms race. In 1944, he put forth the prophecy of what was going to happen, what would be the result that we were going to have from this. [In response], he conceived an idea of how to prevent this. He suggested that one should suggest to the Soviets that we were prepared to tell them about the atom bomb, which they in any case knew about already from their various spies’ activities, if they were ready to collaborate in all aspects of the use of nuclear energy, peaceful and military. Almost exactly the same idea, in fact, came out later.

At that time, Niels Bohr talked to Roosevelt, who was President, and Roosevelt was very sympathetic to the idea. However, he still felt he must convince his partner, Winston Churchill. Therefore, Niels Bohr went to London and had a brief talk with Winston Churchill. Now Churchill was very badly briefed. I believe he literally was not briefed about [Bohr’s idea] and could not understand what Bohr was telling him. The only thing he could follow was that this foreigner was coming [to him] to suggest that he give away a top secret to our enemies. Not only did he reject the idea, but he even told others that this man was against the kingdom. When he spoke, he said that Bohr should be confined. Fortunately, he was stopped from preventing Niels Bohr, but the whole process collapsed—this could have changed the course of history.

Finally when Churchill came [to the US], after the nuclear test, in July 1945, a number of other scientists began to be against the use of the bomb. Among them was Leo Szilard, a genius who had come up with the idea before anybody else. He tried to convince the US Administration not to proceed with the idea of bombing cities. He prepared a petition, which was signed by a number of scientists and the different planners of the Manhattan Project, asking the Government not to drop the bombs on populated cities for the demonstration. This [request] was rejected. The bombs were dropped and what Niels Bohr saw actually, very soon afterwards, occurred. The Russians, who knew about the activities that were going on in the West, decided to carry on with their project and to produce and test their bomb very quickly within four years. In 1949, the US went into a panic about losing the nuclear monopoly. They decided to go in for a super

project, mainly the hydrogen bomb project, which resulted in a nuclear weapon 1000 times more powerful. Russia immediately responded, which began this terribly mad nuclear arms race which ended up with both sides together possessing 100,000 nuclear warheads—100,000 more than anything needed for nuclear deterrence.

Now more scientists who worked on the Manhattan Project were very unhappy about the outcome. They decided that they should do something to prevent another such event occurring. They put themselves into organizations, one was in the United States, the Federation of American Scientist (FAS), which is still in existence. In Britain, Atomic Scientists Association (ASA) started with the same idea—scientists trying to influence the policies of the respective countries, to prevent building up more nuclear warheads. We failed. Nevertheless, we felt we ought to do something. We should continue our efforts to prevent this arms race from getting out of hand. There was a conference between FAS and ASA, talking with each other on different projects, but we felt that just talking to each other was not good enough. The important thing was to try and get the scientist from the other side of the Iron Curtain [to participate]. As it was not really possible to get in contact with the Soviet scientists at that time, we were really frustrated that we could not make very much progress.

Soon afterward, the initiative came from a different corner, mainly from a British philosopher, Bertrand Russell. I had been in touch with him for a certain time about these problems and he gave a very strong speech on British radio, in 1954, telling people about the dangers of the nuclear weapons. He got a very good response and many people suggested that he should follow this idea to see what scientists could do about this issue. He had the idea that we should issue a very strong statement from eminent scientists, if possible from both sides of the Iron Curtain, to appeal to the governments, peoples, and scientists, and to get together to see what they could do to prevent a catastrophe.

At that time, the greatest living scientist was Albert Einstein. For that reason, Bertrand Russell wrote a letter to Albert Einstein with his idea that scientists should get together in a meeting where we would have to discuss the ways to avert the danger [of nuclear weapons]. [On] April 18, 1955, Bertrand Russell was flying from Rome to Paris when the captain of the aircraft announced to the passengers that he just had the news that Einstein had died. Russell felt that without the support and endorsement of Albert Einstein, the whole project would collapse. But when he arrived at his hotel, there was a letter from Einstein, a very brief letter in which he completely indulged the idea of Russell's idea. This was one of the last actions of Albert Einstein. Because of [Einstein's support], this declaration became known as the *Russell-Einstein Manifesto*, and was subsequently signed by nine other scientists. Despite Russell's attempts to get the Russians [to sign], he was unable to get any Russians. Consequently, with these eleven signatures, the *Russell-Einstein Manifesto* was issued at the historic meeting in July 1955.

For some reason Bertrand Russell asked me to chair that conference, which was the most important meeting of my life. Here is one passage from this *Manifesto*, I will read it again because it is very important. It was written by Russell in a beautiful style; do not forget that Bertrand Russell was a Nobel Laureate in Literature. From the *Manifesto*: “We are speaking on this occasion, not as members of this or that nation, continent, or creed, but as human beings,

members of the species Man, whose continued existence is in doubt.” Next comes the paragraph that Natalie read earlier: “Here, then, is the problem which we present to you, stark and dreadful and inescapable: Shall we put an end to the human race; or shall mankind renounce war? People will not face this alternative because it is so difficult to abolish war.” I am now the only living signatory of the eleven people who signed this manifesto, and I consider it my duty, the mission for the last few years of my life, to go on to remind you of this *Manifesto*.

The *Manifesto* brought forth the request for scientists, from all over the world, to get together in a conference to see what they could do to prevent a nuclear war. Soon after the *Manifesto* was issued, we received a letter from a certain gentleman named Cyrus Eaton, who was a native of Pugwash. He was offering to pay all of the expenses of the conference if it was held in Pugwash. Now in those days, I was given the task to look into [this offer]. The only Pugwash that I knew of at the time was Captain Pugwash; this Captain Pugwash story still goes on now in England.

From the beginning, we treated [this proposal] as a hoax. But then I looked in a gazetteer to find that Pugwash really existed—there is such a place in Nova Scotia. In July 1957, this first conference, called for in the *Manifesto*, took place. As you can see in this picture, there were 22 participants, who came from 10 countries. The importance of this conference is that this was the first time that eminent scientist from both sides of the Iron Curtain came together to talk about not purely scientific matters, but matters that were, in essence, political issues—very sensitive issues at the time. From this point of view, [the conference] was really a very important occasion.

I must tell you that we had great worries about [the conference], because I was afraid that we would end up in disarray. At that time, even scientists in the West were deeply divided on these issues. We feared that if we should meet with the communist members, we would break up in disagreement. However, it did not happen. In fact, the conference was a great success.

I ascribe [this success] mainly to the fact that this was a meeting of scientists. The people who met there were mostly physicists, about 70 percent of the participants were physicists and they knew each other from their scientific work, not from personal knowledge. They had trust in their colleagues’ scientific integrity and so we built on that scientific integrity to extend to outside purely scientific matters. Of course, in addition, we decided that the meeting should be conducted in the way a scientific meeting is conducted—in a purely impartial manner, rather than with preconceived ideas. I think that this is the reason why the conference was a great success and why we decided that we should continue—that this should be the beginning of a new movement which was to become known as the Pugwash Conferences on Science and World Affairs. What is Pugwash? “The Pugwash Movement is an expression of the awareness of the social and moral duty of scientists to help to prevent and overcome the actual and potential harmful effects of scientific and technical innovations, and to promote the use of science and technology for the purpose of peace.”

Now as I mentioned before, there were some great difficulties in these early years with Pugwash, because the idea of scientists from the West sitting with Soviet scientists to discuss these issues was reason enough to condemn these people as being either communists or some sort of socialist.

This was the propaganda that we had in the West. This put off many people from going to these meetings because they were afraid it would affect their careers. It was not easy to come to a Pugwash meeting in those days. We had to endure this because we knew the political situation was very tense. We knew some of the Soviet scientists would come and bring in propaganda, but we could very easily see through their very clumsy ways of bringing this in. More of the scientists were genuine scientists and their popularity was the reason why we were able to come to agreement and to continue.

It took the governments of American and Britain a few years before they realized that Pugwash was a genuine body and that we were not ready to spread propaganda. When they realized this, they of course changed completely—they tried to influence us. First, they accused us of spreading propaganda but changed to trying to advise us on who should come to meetings, what we should discuss and so on—I resolutely said no. This is an example of a letter written in 1961, pointing out the problems they had in dealing with me on this issue. However, the Russians continued coming to these meeting, and we managed to continue along those same lines.

What have we achieved? I am speaking of Senior Pugwash, in a moment I will address Student Pugwash, so what have we achieved? You must remember that we started at the height of the Cold War, at the time when there was a lot of propaganda and fear on both sides. There was a real possibility that the Cold War may turn into a Hot War. In fact, there were several occasions where we came very close to it. The fear became that the end of the civilization would be caused by the use of nuclear weapons, which happened on several occasions. Hence, our first task was to try to build a better and different picture, to show that we could stop the arms race—to halt the arms race. This could be done by measures which concentrated on various agreements. A number of treaties were discussed at Pugwash. Some of them are international treaties which are now on the agenda—for example the Non-Proliferation Treaty, which is in danger, and so on.

[These measures] were our task during the war years, and I think we contributed in a certain measure to these achievements, which really helped to prevent a nuclear war from breaking out. Of course, many organizations were also involved in preventing this catastrophe. Pugwash cannot take the only credit for itself. But I, perhaps, claim a little bit of credit for avoiding nuclear war so far—only a little for Pugwash. For example, Michael Gorbachev who was the President of the Soviet Union said, “Various activities purely scientific and global authority, Pugwash contributed in a unique way to averting the imminent danger, has helped to stop the Cold War, and to achieve profound positive changes in the development of the world.” We know that a few of the Pugwash scientists, including American scientists, one of which is here today and is one of your speakers, played a very big role in influencing the policies of Michael Gorbachev, in this way helping to bring the Cold War to an end.

Perhaps the formal tribute was the Nobel Peace Prize in 1995, and this is the citation from the Nobel committee:

*“The Pugwash Conferences are founded in the desire to see all nuclear arms destroyed and, ultimately, in a vision of other solutions to international disputes than war. The Pugwash Conference in Hiroshima in July this year declared that*

*we have the opportunity today of approaching those goals. It is the Committee's hope that the award of the Nobel Peace Prize for 1995 to Rotblat and to Pugwash will encourage world leaders to intensify their efforts to rid the world of nuclear weapons."*

The last sentence of this citation speaks about the goal of eliminating such arms and this brings us back to the goal Pugwash has had since the beginning, mainly not just to reduce the number of nuclear weapons in the arsenals, but to actually eliminate such arms. This brings us back to what has been our goal from the very beginning and this is still our goal to today, which was repeated at our last conference.

As soon as the Cold War was over, we began efforts in this direction with a project under the name "The Creation of a Nuclear-Weapon-Free World," which was also one of the first of the projects at that time. We hoped, at that time, to make progress in that direction. Unfortunately, the progress went badly. I believe that one of the reasons was that at the end of the Cold War, the public in the general thought that this was also an end of nuclear danger—that they no longer need to worry about it. Therefore, people lost an interest in the issue, which enabled the two subsequent administrations to go ahead [with their actions], counting on the fact that public would not notice changes. Then last year, the current Administration came in with a different policy, which is, of course, completely opposite with their declaration about nuclear weapons. Now we are, in fact, talking about using them, not just as a deterrent, but as a nuclear strike. This is a situation that I am not going to talk about now, but it is a grave situation.

Thus, I must end by reminding you, because it is very important, "There lies before us, if we choose, continual progress in happiness, knowledge, and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? We appeal as human beings to human beings: Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise; if you cannot, there lies before you the risk of universal death." We are now back in the same situation as during the Cold War, so I call particularly on young people to remember your humanity.