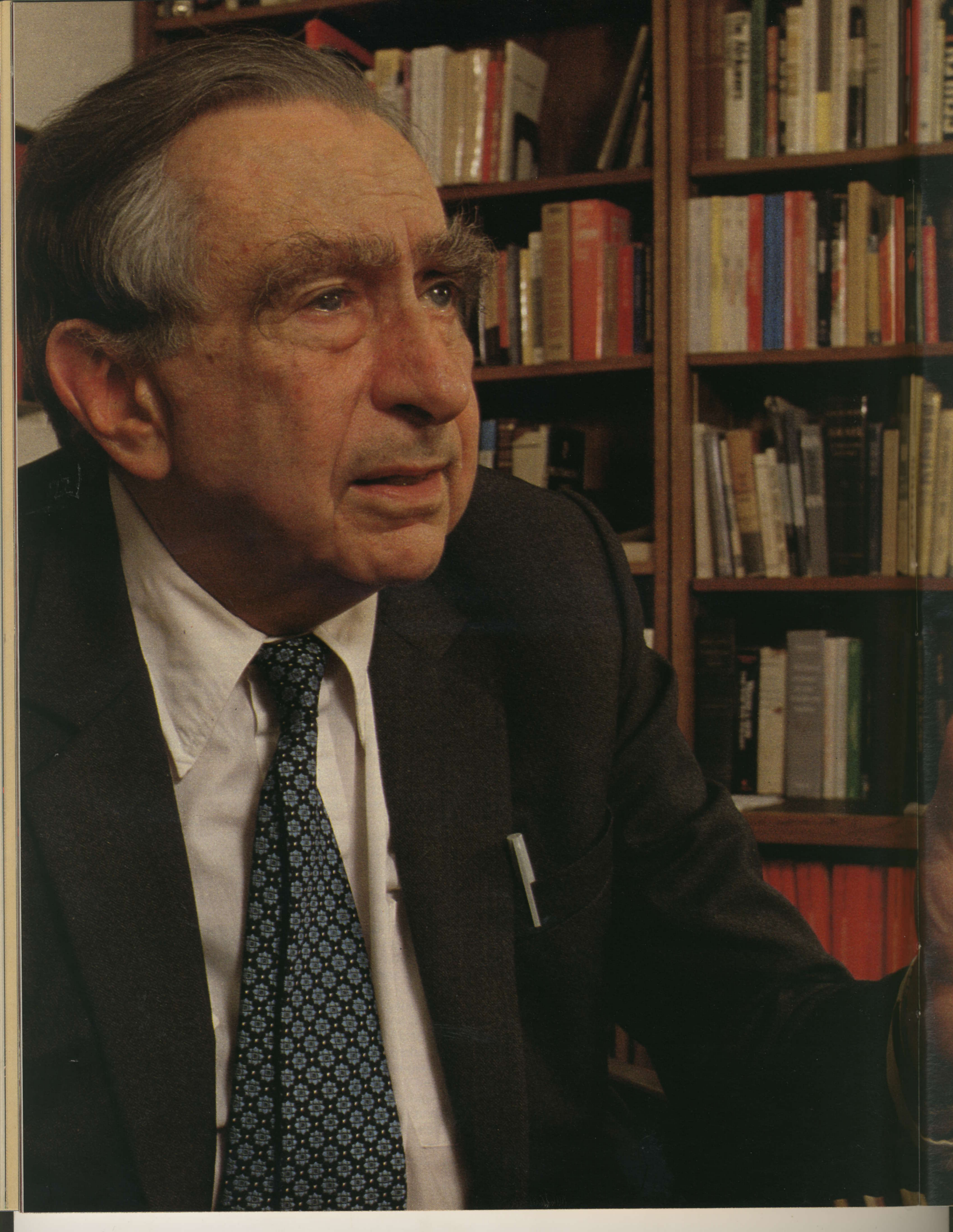

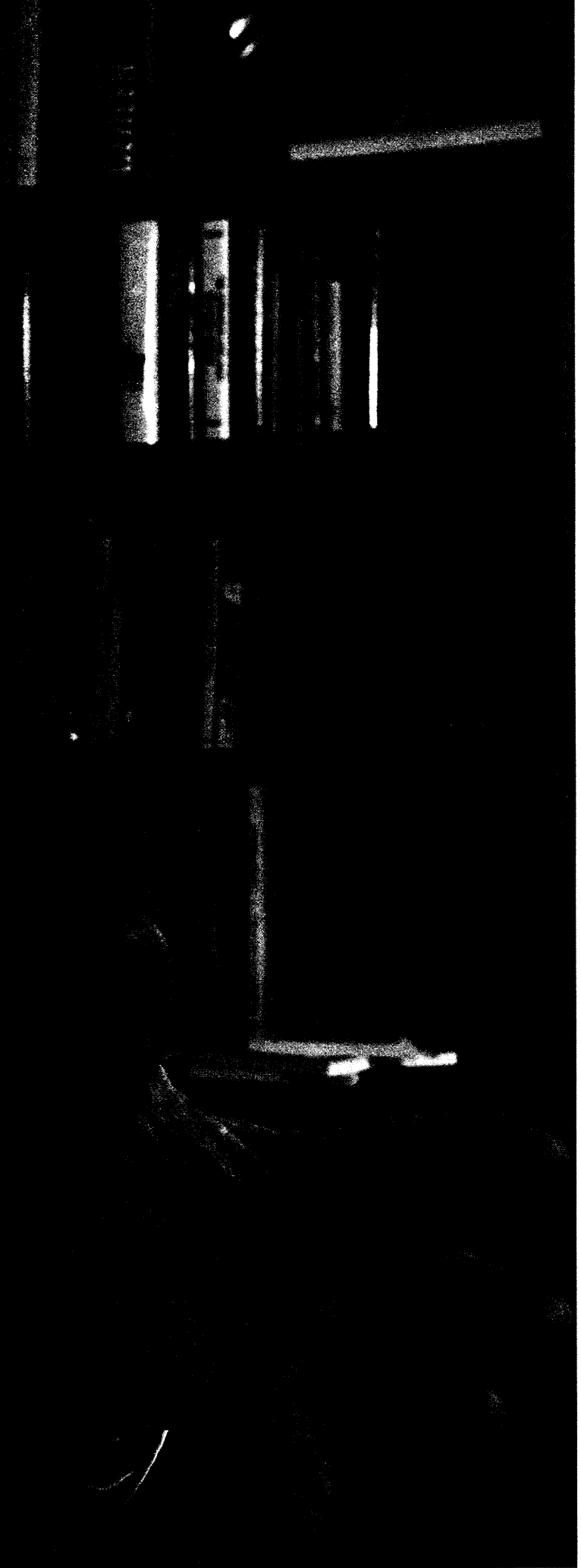

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PENTHOUSE INTERVIEW

"To date, nuclear power,
from a health standpoint, is the safest
source of energy we have.
An automobile accident poses more of a danger.
There's the paradox: That
which is most safe is what we most fear."

EDWARD TELLER

For more than a quarter of a century, he has been called the father of the hydrogen bomb. Yet today, at 75, Edward Teller is annoyed by the labels. "I am the father of my children and the grandfather of my grandchildren," he says. "To call me the father of a bomb is in poor taste."

Despite such protestations, physicist Edward Teller *is* best known for building the H-bomb—still the most potent weapon on earth. For his role in promoting the development of nuclear arms, he has gained numerous enemies and the wrath of his scientific colleagues. But that has not stopped him from voicing views on issues from disarmament to nuclear waste. Through the years he has criticized test bans, arms-limitation treaties, and nuclear-freeze drives. Recently, Teller even helped promote President Reagan's plan to build a nuclear-defense system based on lasers and other exotic weapons that could deflect enemy missiles raining down from space.

Teller has also worked to establish alternative forms of energy: nuclear fission, nuclear fusion, solar power, and even wind-generated energy. "No single solution exists for the energy problem," he said in his recent book *Energy From Heaven and Earth* (Freeman, 1980). As the book's title suggests, Teller feels we should utilize energy wherever possible—from the sky and from the earth—as long as we can make it cost-effective and safe.

Toward that goal, Teller is currently advocating "methacoal," a new type of fuel. "It is a mixture of water, pulverized coal, and methyl alcohol," he explains. "If you drink it you'll go blind, but it can be shipped in oil tankers and distributed worldwide, and it's about 30 percent cheaper than heating oil."

Whether he's promoting new weapons or alternative fuels, Edward Teller, born in Budapest in 1908, has been at the center of world events for most of his life. He was six years old when World War I broke out. By the time he was 12, Hungary had been invaded by czarist Russia and crushed by the Allies. It had also undergone a Communist revolution and then a counterrevolution that brought on a Fascist, military-style dic-

tatorship under the anti-Semitic Admiral Miklós Horthy.

Teller, like tens of thousands of others, left Hungary to escape Horthy's policies. He traveled to Germany and there attended the Institute of Technology, in Karlsruhe, and in 1930 he received a Ph.D. in physics from the University of Leipzig. But soon after Teller began his first job, at the University of Göttingen, Hitler came to power. Teller knew he had to leave once again.

He settled in Washington, D.C., in 1935, but in the following four years never once visited the Capitol. "That's how apolitical I was in those days," Teller notes with a wry smile. However, his fellow immigrant Leo Szilard was convinced that the Nazis, with their superb physicists, would build an atomic bomb. (In 1934, Szilard had filed a patent for a chain reaction—the basis of the release of atomic energy.) In 1939, Szilard, accompanied by Teller, convinced Albert Einstein to inform President Roosevelt of the atom's terrible potential. Soon after, the top-secret Manhattan Project began to build the bomb.

Teller followed the trail of physicists to the weapons laboratory at Los Alamos, New Mexico. There, under lab director J. Robert Oppenheimer, he helped to develop the atomic bomb. (Based on the principle of fission, the A-bomb would release large amounts of energy when the atomic nucleus was split.)

But from the beginning, Teller found it difficult to concentrate on the task at hand. He had his heart set on building what he called the "super"—the hydrogen bomb based not on fission but on fusion, or the fusing of atomic nuclei. Teller knew that when atomic nuclei fuse, enormous quantities of energy are released; if the super could be built, it might be 1,000 times more powerful than its fission counterpart. Teller eventually gained permission to devote much of his time to the fusion-bomb concept, and he worked on it throughout the war.

But after the atomic bomb was dropped on Hiroshima and Nagasaki, his efforts seemed futile. Most of the Los Alamos physicists were appalled by their accomplishment, vowing never to build weapons again. Stopped in his tracks, Teller declared the sentiment suicidal. The only route to national security, he said, was an increasingly strong defense—including construction of the super.

In 1950, Teller *was* given the go-ahead for his project—after the Soviets built an A-bomb on their own. Working out of Los Alamos, he and his group completed the first H-bomb in 1953. The Soviets accomplished the same feat almost simultaneously.

But the heated controversy over weapons research was by no means ended. The following year, the government held a hearing to decide whether Dr. Oppenheimer was a security risk. Basing their case on Oppenheimer's suspected leftist leanings, officials conducted one of the most charged hearings of the McCarthy era. Though there were dozens of witnesses, some say Teller's testimony was among the most damning. "In a great number of cases, I have seen Dr. Oppenheimer act in a way that for me was exceedingly hard to understand," Teller told the judges of his former friend. "I thoroughly disagreed with him on numerous issues and his actions frankly appeared to me to be confused and complicated. To this extent, I feel that I would like to see the vital interests of the country in hands that I understand better and, therefore, trust more."

The panel ultimately denied Oppenheimer security clearance, because he'd given false information to wartime security officers. Nonetheless, Teller found that his testimony had made him suspect in the scientific community. Many of his best friends pulled away from him, and with one exception, says Teller, there have been almost no real, earnest reconciliations in the subsequent 30 years.

Rejection, however, has not stopped Edward Teller from continuing to speak out. For the past three decades, he has been a premier advocate of a strong national defense. Operating from his current post at Stanford University's Hoover Institution, he enjoys talking about what he calls "popular myths"—notions that "prevent the development of workable plans to preserve peace." Among those myths: that a nuclear freeze will stop the arms race, that nuclear war will mean the destruction of the human race, and that we cannot protect ourselves with adequate civil defense. "The reality of nuclear weapons is grim enough," Teller states. "Exaggerations about them are apt only to paralyze us."

Finally, although Teller feels Americans have exaggerated the dangers of nuclear war, he is more concerned about their negative attitude toward nuclear power. "Today, nuclear power is still the cleanest, safest source of energy we have," he says.

Called obsessive even by his closest friends, Teller clings tenaciously to his beliefs. He dismisses challenges with feisty one-liners, pursuing a logic that is often hard to pierce.

An interview was conducted with Dr. Teller for the German edition of *Penthouse*, by Editor-in-Chief Martin Speich, in the small Sicilian mountain village of Erice, where the physicist was taking part in the Centro di Cultura Scientifica Ettore Majorana's summer course on theoretical physics and in its seminar on nuclear war. The bulk of this interview was provided by *Omni* Editor Pamela Weintraub, who spoke with Dr. Teller in New York in the fall of 1983. The German portions of the interview were translated by *Penthouse* Copy Chief David Grambs.

Penthouse: Why did you leave Europe for the United States?

Teller: I started my career in Germany, but I'm a Jew, and it became clear after Hitler came in that I would never be able to work there as a scientist. In 1935, I was invited by George Washington University to be a professor and so my wife and I left for Washington, D.C. I've been in the United States ever since.

Penthouse: After you moved here, you decided to switch from theoretical physics to weaponry. How did this come about?

Teller: It started with a fellow Hungarian named Leo Szilard. He's the man who really got nuclear-explosives research started in the United States. He visited Albert Einstein and asked him to write President Roosevelt a letter about the potential for building an atomic bomb. Actually, I entered the history books by acting as Szilard's chauffeur, as it were. I just drove the car. In principle, I understood and agreed with Szilard's reasons for wanting to build an atomic bomb, but at that time I was by no means ready to change my life's work. I didn't make that decision until the spring of 1940, when I was invited to attend a scientific congress where Roosevelt was speaking. At one point, Roosevelt said, "You scientists have been accused of doing great damage to human life. But I can tell you that if you will not work on weapons, then freedom cannot be defended." Roosevelt had received Einstein's letter, and I had the peculiar feeling that he was addressing only *me*. At that time, I felt that among all the thousands of people in the room there were two, namely, me and Roosevelt, who knew about the possibility of the atomic bomb. In any case, by the time he had finished speaking, my mind was made up, and I haven't changed it since.

Penthouse: Soon after you made that decision, you began to work on nuclear explosives at Columbia University with Szilard and the physicist Enrico Fermi.

Teller: Yes, as a visiting professor. I think I was invited because Szilard and Fermi didn't get along with each other. It was hoped that I could act as a buffer, because I was friends with both. We needed pure graphite. Large quantities were needed to construct the reactor, so I asked for $6,000 to complete the first year's work. Szilard was mad at me for having asked for so little, and believe me, it didn't help when I said I was just repeating Fermi's request. We got the money, but since then, whenever I ask for money for a project, I usually ask for more than $6,000! Soon after that, I joined a small group of scientists in the Manhattan Project at Los Alamos, where we put the explosive together.

Penthouse: In an article published in *Los Alamos Science*, you wrote that there had been an effort on behalf of the scientists involved in the Manhattan Project to stage a "warning" explosion before actually dropping the bomb on Japan.

Teller: What happened was that one day, in the late spring or early summer of 1945, I got a letter from Szilard suggesting that

we demonstrate the bomb to the Japanese, giving them a chance to surrender before we used it. He had a petition he wanted me to sign and then circulate among the others at Los Alamos. I agreed with him and was ready to sign, and would have except I didn't think I should circulate it without first discussing it with J. Robert Oppenheimer, who was the director. He was opposed to the petition. Basically, he didn't think that we, as scientists, should be mixing in such matters. He thought that the people in Washington understood the Japanese better and that I should just forget the whole thing.

I didn't argue. I wrote Szilard but didn't mention I'd spoken with Oppenheimer. At Los Alamos our mail was censored, so I knew Oppenheimer would certainly see whatever I wrote. Later, I was shocked to find out that while Oppenheimer told me to stay out of it, he did get involved and used his influence to promote the bombing. At that point I realized that when I have something to say, I should say it. I think I made a mistake in not sticking with my true feelings, and I've regretted that.

Penthouse: What, then, was your reaction when the bomb was dropped on Hiroshima?

Teller: I was really very unhappy. I'm convinced now, and I had a hunch then, that in the long run our dropping the bomb would have terrible psychological effects. It has. If we had managed to end the Second World War without killing a single person, just by demonstrating the power of science, then today people would look at science in an entirely different light. Perhaps the strongest impact was made on the scientists themselves. Remarkably enough, the people who advocated dropping the bomb became the strongest opponents of continuing the work.

The Hiroshima and Nagasaki bombs cost about 70,000 or 80,000 human lives. Still, it signified the end of a terrible war that cost—so far as I know—more than 50 million people their lives and led to enormous suffering in many countries. Thus, the first reaction when the bombs were dropped was a sigh of relief. But then, after a few years, fear set in: What will happen now? If there was ever a situation where horror stories could arise, it was exactly this situation.

Penthouse: This sentiment certainly didn't grip you as strongly as others. You urged this country to go on and build the hydrogen bomb. Can you explain your rationale, especially in the light of your opposition to dropping the bomb in the first place?

Teller: I had two reasons. First, here was something new, a weapon based on a different principle, one using nuclear energy in an entirely new way. It was basically a quest for knowledge. To abstain from developing it simply seemed wrong.

Second, in 1945 Stalin said, "We are going to have the atomic bomb and we are going to have much more." I considered Stalin's threat real. I foresaw—and I happened to be right—that the Soviets were working on the hydrogen bomb and that we would be at a great disadvantage if they developed it first.

Penthouse: How do you compare those weapons with the new weapons of today?

Teller: An atomic bomb was more than 1,000 times more powerful than conventional explosives. The hydrogen bomb was 1,000 times more powerful than the atomic bomb. Both of these weapons were born within seven years of each other, which naturally made people think that there was no limit to what we could do. Now, the American arsenals—and, I believe, to some extent the Soviet arsenals—have been and are being converted to smaller weapons having greater accuracy of delivery. We are learning how to construct smaller but more refined weapons for use against invasion, and we are also trying to build weapons that are primarily designed to be used not against people but against offensive weapons.

Penthouse: Can you give an example?

> If 750,000 people demonstrate for a freeze in Manhattan, then the Kremlin applauds. When seven people demonstrate in Moscow, they are promptly sent to the Gulag Archipelago.

Teller: For defense against invasion, I'm talking about small atomic weapons that each have the energy equivalent to about a hundred tons of dynamite. They are detonated about 100 or 200 meters above the ground. A comparison: The original hydrogen bomb was equivalent to a million tons of dynamite. It worked through enormous pressure, which destroyed everything within miles and spread enormous heat and radioactive fallout over a large area. With small weapons, none of this happens except for the radiation. The immediate radiation is more intense than with the hydrogen bomb, but only for a short distance. Civilians in the target area of a smaller modern nuclear bomb would suffer, but safety could be found less than a mile away. For example, houses would remain standing, and anyone with a decent basement and about a meter of earth surrounding it would be protected.

Penthouse: In addition to weapons that attack an enemy's missiles on *his* territory, we seem to be developing a new generation of weapons that can deflect incoming missiles. These weapons were referred to by President Reagan last March in his so-called Star Wars speech, when he suggested zapping enemy missiles with lasers and particle-beam weapons in space.

Teller: The president did not say—and you can look it up—he did not say *space* or talk about weapons. He said, "Is it not better to save lives than to avenge them?" The methods by which we can achieve such a defense are classified, so I can't be too specific. But in the last year, some of my younger friends have come forward with a number of very promising approaches, which, incidentally, I was a little slow to accept. I'm not talking about one defensive weapon, I'm talking about half a dozen different kinds. It's still too soon to tell which ones will work, but that they should all fail is fantastically improbable. That some of them will work is, I think, practically assured.

Penthouse: We realize that these approaches are classified and that you can't give exact details, but can you give us some idea of what you mean?

Teller: Different defensive weapons should do different things. We want to shoot down intercontinental ballistic missiles, short-range missiles, cruise missiles, and airplanes. Now, you can use nuclear weapons or you can use a laser beam and direct it with fantastic accuracy. That would mean, for instance, that if the laser was 5,000 miles from its target, it could hit that target within an accuracy of 25 feet. Now, these defensive weapons may be lasers, but they would probably be based on the ground and not in space. They would, essentially, allow you to stop the attack at the last moment, after the rockets have left their silos.

The real distinction is not nuclear or non-nuclear; the real distinction is attack or defense. For attack, anything is objectionable. For defense, anything that works against weapons but not against people is permissible.

If defense is to be effective, it should cost less than offsetting developments in attack. If you can offset the defense just by making more attacking weapons, you have accomplished nothing. If, on the other hand, the defense can be accomplished with considerably less effort than the other side has to muster in order to carry out the attack, that will be the end of the offensive-arms race, because the developing of those offensive arms will no longer have a rationale.

Penthouse: Yet many critics say that these new defensive weapons will just bring on another generation of offensive weapons, which will then require another generation of defensive weapons.

Teller: Look, in principle I even agree with them. But I also say these critics can support their arguments only if they name the specific ways in which this defense can be counteracted. I'm not saying that we will make defensive weapons and that from then on offensive weapons will have no chance. I don't know the future. I do know something about the next step, and I claim that our critics have not even looked into the next step.

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Penthouse: Okay, let's say we manage to construct this antinuclear shield around ourselves. How effective would it be?

Teller: There are many who say that a shield must stop 99.9 percent of the missiles in order to be meaningful. I say nonsense. If we predict that it will stop 80 percent of the incoming missiles, I'm satisfied, at least for the time being, and I'll tell you why: because 80 percent on paper means anything between 50 percent and 95 percent. We may have overestimated it, we may have underestimated it. But we know one thing about the Kremlin: Soviet rulers are exceedingly cautious. They don't act unless they are sure of success. So if we have done nothing else, we have introduced enough uncertainty to make sure their attack doesn't come.

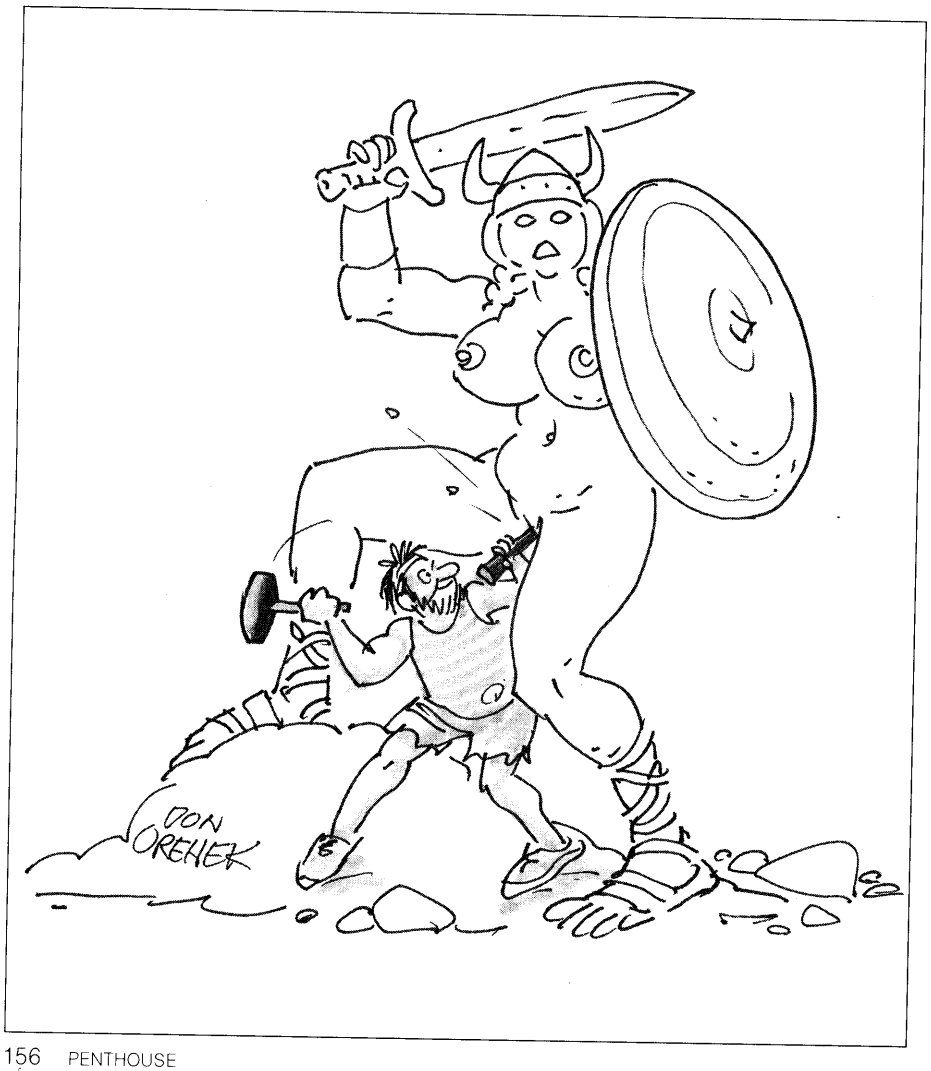
Now, I want to deflect 99.9 percent of the missiles, and I'm not telling you that this cannot be achieved. But as a relatively short-term goal—in a decade or, with luck, less—I think we'll be able to deflect 80 percent of the missiles coming down.

Penthouse: Then obviously they can still come down. Can we protect ourselves with civil defense?

Teller: Just this morning I had a conversation with an engineer who is a Russian refugee. He told me an incredible story about Soviet civil defense. It seems that in the early 1970s the Soviets asked a British company, best known for its razor blades, to build two factories based on similar constructions in Great Britain. The Soviet factories were built with shelters, and when the British came over to inspect the plants they naturally asked questions about the shelters. But no one would even confirm that that was what they were. The workers were forbidden to confirm the existence of the shelters. This man also told me that in Moscow each factory has shelters. The Soviets also have plans to evacuate all workers within a distance of 40 miles or so by using public transportation. Only the workers, not their families. Besides this, in Moscow they also have a very deep subway system, which can accommodate a million people in an evacuation. We happen to know a lot about Soviet civil defense from our intelligence gathering, but why this information isn't released is sheer idiocy. If there is one thing we could do better than the Soviets, it's civil defense.

Penthouse: Why is that?

Teller: They have problems with public transportation. For us, it would be nothing to evacuate a city, even New York City, in 24 hours.



Penthouse: It's hard to get out of New York during rush hour!

Teller: During rush hour practically everyone is moving at the same time, and the cars aren't even fully packed. During a civil-defense action, if vehicles were fully packed, we'd have only 30 percent more cars to move than during an ordinary rush hour. Also, the traffic signs could be adjusted so that practically all the streets would become one-way—you could only leave the city. And you'd have 24 hours to accomplish all this, not just a few hours.

Penthouse: How would you know where to go?

Teller: The president could go on the air and say, "We have observed that the Soviet cities are being evacuated. You do what you like, but I think your chances of survival are very good if you leave the city. Call such and such a number and they will tell you what to do."

Penthouse: They would have to have millions of people manning those lines.

Teller: Not millions, thousands. And when you called you would be told to leave at a certain time, say, between one and two o'clock in the morning. You'd also be told what to bring and where to go. The places you were sent to would already have stockpiles of food and medical supplies. I believe that evacuation for a period of three months could be handled without real suffering.

Penthouse: It sounds awful and very frightening.

Teller: Yes, but on the other hand, fear is a stimulant. We would make it possible for families to stay together. For many families, it would be a novel experience for the children to see more of their parents. Look, this would be an ill wind, but it still blows some good for some people.

Penthouse: How can you be sure we'd have that warning time? Maybe the Soviets would attack without first evacuating their cities.

Teller: Their whole population would be at risk if they didn't evacuate.

Penthouse: What about those who *have* to stay in the city for defensive purposes? Can we protect them?

Teller: Look, civil defense has many sides. And I have tried to emphasize the side that I think should come first, because it's the easiest. But we must also build the best possible shelters for the police and fire brigades who will stay behind.

Penthouse: Then these people who stay behind can be close to ground zero and still survive?

Teller: It depends. If the enemy uses a multimegaton earth penetrator and you are at ground zero, it's not good. But if they drop a smaller bomb into, say, the Hudson, producing earthquakes, there might be a better chance. If you have decent shelters, probably 90 percent of those who stay in the city, and quite possibly more, will survive.

Penthouse: But won't the ones who live be affected by the fallout. How long can they stay underground?

Teller: The fallout shelters will provide necessary protection. Fallout cleanup is the next stage; that is more difficult and deserves more attention. I'm not saying that these are easy things. But I am saying that they have been sorely neglected. And, as I said, in civil activity we can outdo the Soviets a hundred to one.

Incidentally, we now have started to worry about a "nuclear winter." The dirty smoke from many burning cities may shut out sunlight and cause a severe temperature drop. The question is important, but the answers are not yet clear. In any case, the best plan would be to create a defense against nuclear bombs. I'm not advocating the abolition of retaliatory forces; I just want to de-emphasize them.

***Penthouse*:** How do such defensive strategies relate to what we call mutually assured destruction?

Teller: Without a defense against missiles, we have to depend on what we call a balance of terror—or MAD, for short—which means we and the Soviets are reciprocally able to destroy each other; the mutual threat will supposedly prevent anyone from striking first. But the concept is impractical, because defense that makes this deterrence useless can always be found. And, therefore, we must put our weight behind developing protective weapons. We'll always need deterrence, but I hope that by the year 2000, 90 or 95 percent of all nuclear weapons will be protective and only about 5 or 10 percent of them will serve as threatening weapons. It has become an axiom that there is no defense against nuclear weapons, but this is false.

***Penthouse*:** You've suggested that the Soviets are more of a threat to us than they were before. But don't you think our respective nuclear arsenals might be just about equal?

Teller: I wish we were equal. It is, unfortunately, like Orwell said in *Animal Farm*: All animals are equal, but the pigs are more equal than the others. Now, the Soviets are quantitatively ahead of us in rocket technology, in nuclear weapons, in tanks, in almost everything except computer capability and maybe electronics. We claim we are ahead of them qualitatively. Supposedly, while they are ahead of us in everything one can check, we are ahead of them in everything that cannot be checked. I consider this a suspicious argument. The Soviet refugee I mentioned before says that Soviet military technology is way ahead of Soviet technology in every other field. When people say our technology is better than that of the Soviets, they are talking about nonmilitary technology, which, in general, is not secret. As far as the hidden part is concerned, the least that one can admit is that we have no evidence that we are ahead. I myself have pieces of evidence, most of it classified, that they are ahead. One related thing that I can mention, which is known, is that the Soviets already have a protective shield around Moscow. In the last few years, they have greatly upgraded that defense.

***Penthouse*:** We don't have the same thing?

Teller: We have it on paper, and I think in a poorer form. If you actually deploy things, you can learn a lot.

***Penthouse*:** Yet, defense experts, such as nuclear physicist Hans Bethe, disagree with you. They say that while the Soviets have more missiles, we have more warheads on each missile. And Bethe says that they naturally have more land-based missiles because they have a larger landmass, but we have more submarine-based missiles because we have more access to the sea. The upshot, he says, is relative equality.

Teller: Bethe does hold the opposite point of view—no question about that. I don't know the latest figures on the number of submarines. I do know that the Soviets are building submarines at a much faster rate than we are. Let me give you an example. I'm not giving you a statement, only a potential statement: We may be carrying more nuclear rockets on our submarines. That is what Bethe may have asserted, and that may be true. What about the nuclear submarines that don't carry nuclear warheads? The hunter-killer submarines that can be used to destroy our nuclear submarines before they're even deployed? The beginning of their first strike may consist of a quantitative destruction of all our submarines. Now, that can be done by conventional methods.

***Penthouse*:** Then, we take it you feel the Soviets would win a nuclear war?

Teller: The Soviets may win it, but the definition of winning depends on your value system. If you want power and care less about human life and human suffering, then you can win. In our value system, the moment we have nuclear war—in fact, the moment we have war—we have lost.

***Penthouse*:** But you believe that we can survive a nuclear war?

Teller: Yes. If we can survive, that in itself is a deterrent. To survive is a duty. It means there is a future, for us and for those who want freedom. Our survival may make the nuclear war unwinnable for them. Now, I don't think we can win a nuclear war; what we must do is deter it. But one can deter by defense and even by assured survival.

***Penthouse*:** Do you think war might be prevented altogether by something like the nuclear-freeze movement?

Teller: The freeze is as simple as a can opener—and as useful as a can opener for preventing nuclear war. There is no such thing as a two-sided freeze. If 750,000 people demonstrate for a freeze in Manhattan, then the Kremlin applauds. When seven people demonstrate in Mos-

"It's okay, Miss Farwell, I can fuck you and fuck the public at the same time."

cow, they are promptly sent to the Gulag Archipelago. You see, while the terror is certain, the balance is not. We need to defend ourselves with something more stable.

Penthouse: Many of those in the nuclear-freeze movement are also opposed to nuclear-power plants that generate electricity. They fear that these plants may be dangerous, too. How do you feel about that?

Teller: After the atomic bomb was dropped, when nuclear power began to be used for peaceful purposes, safety played a central role. In 1948, the Atomic Energy Commission was established, and one of the first orders of business was to form a committee to make nuclear reactors as safe as possible. I was the first chairman of this committee and worked on it for several years. It was clear even back then that nuclear reactors would simply not be tolerated if a single really big accident occurred. Our goal was to see to it that industrial nuclear reactors should never cost a single human life. To date, nuclear power, from a health standpoint, is the safest source of energy we have. And why? Because even 20 years before the first industrial nuclear reactor was finished, we went to work with great foresight and care. Such caution was never before practiced in any other area of industrialization—not with coal, not with waterpower, not with natural gas or oil. There's the paradox: That which is most safe is what we most fear.

Penthouse: Would you move into the vicinity of a reactor and live there?

Teller: I wouldn't be in the least worried. An automobile accident poses more of a danger. It so happens that my children and grandchildren live in Illinois, which has, I think, the greatest percentage of reactors.

Penthouse: Surely, one of the fears is that people who live in the immediate area of a reactor can be exposed to harmful radiation.

Teller: Here's an amusing story that answers your question. This happened during a public discussion with a local antinuclear group before the building of the Dresden III reactor, in Illinois. Don't ask me why an American reactor is named after an East German city—I haven't found the answer to that one yet! Anyway, someone I know who was there was arguing against the planned site of this third reactor. A friend from the Atomic Energy Commission asked him, "What gives you more radiation: If you lean against this reactor for a whole year or if you regularly sleep every night next to your wife?"

Now, the man had no answer, so my friend continued: "You know, everybody has radioactivity in his own body, because the potassium in the blood and elsewhere is slightly radioactive. You can't escape this irradiation. So your wife *is* actually giving you some radioactivity. Now, which is the greater source of irradiation? The reactor has more radioactivity, but it also has more padding than your wife. Actually, you get a little less radioactivity from your wife, and, therefore, I'll object to having a law enacted that says that married people must sleep in separate beds. But I must warn you against sleeping with two women at night, for then surely you will receive more radioactivity than you would from Dresden III."

Penthouse: Another problem seems to be the disposal of radioactive waste.

Teller: This problem was solved more than ten years ago. The basic method is as follows: When a fuel element is used up, it is withdrawn from the reactor and placed in a 30-foot-deep pool. There it is cooled by the natural circulation of the water for about ten years. The rod is then reprocessed, the usable fuel recycled, the other valuable elements like cesium removed, and the residue incorporated in borosilicate glass or some other insoluble material. The little remaining residue is then buried in a dry, geologically stable underground area, such as a salt mine or an alluvium. In a few hundred years, the radioactivity will have declined to below the level that exists in a uranium mine.

> Men and women should have the same rights. But I'm also persuaded that men and women are different and I hope they stay that way. It's more fun.

In Sweden, the method has been modified so that fuel rods are cooled in a pond for 30 years and then buried in granite. In the United States, several such projects were begun as early as 1976, but they were stopped by President Carter. You see, after he became a navy lieutenant, he studied under Admiral Rickover, who built the first atomic submarine, and Carter didn't finish the course. When he was president, he let it be known that he understood nuclear energy, when in fact he carried a great antagonism toward it. He even wanted to prevent other nations from tackling the questions of waste disposal. Now Ronald Reagan has taken over the rudder, and he is a more reasonable person. We're steering a more realistic course, because while reactors are safe, the final disposal of waste material can be made even safer.

Penthouse: Finally, there's the expense of nuclear energy. It was always touted as the cheapest form of power, yet how could the accident that took place at Three Mile Island cost as much as $1 billion.

Teller: A nuclear reactor is completely different from a normal boiler, which works on oil. There you are paying for the oil first. Today's fuels make up perhaps 75 percent or more of the electric bill for those generators. With a nuclear reactor, the raw materials, such as uranium, cost 10 percent or less. Three-quarters of the costs are generated by the capital investment. When a nuclear reactor stops functioning, there are huge financial losses. First of all, there is the cost of repairing or replacing the capital-intensive reactor. Next, however, there is the high replacement cost of electricity, which the reactor would have produced cheaply and now has to be replaced by more expensive power from other non-nuclear power plants. Then, out of excessive fear, the safety committee will decide that other reactors of the same type must not be operated at full power. This is a mistake. It hardly results in making these reactors safer. We've begun to correct another mistake by raising the salaries of the people responsible for running the reactors. The pay was too low, and as a result we got operators whose competency was limited. If pilots were as ignorant as nuclear-plant operators, I wouldn't fly in an airplane.

Penthouse: Dr. Teller, you are usually regarded as a man of logic and intellect. Do you think people are too often swayed by their emotions?

Teller: True. We are all led more by emotions than by thought and logic. I won't say that it should be totally otherwise. Future man must not be cold and calculating; he should have enough intelligence to keep himself and everyone else alive so that he can use the new technology for the good of mankind.

Penthouse: You once took part in a discussion of atomic energy on Austrian television. While you were speaking, there were close-ups of the only woman on the panel, and she had tears running down her face. Would you consider that an expression of female emotion versus male logic?

Teller: It is possible that women are sooner given to shedding tears than men. I think this is one of the most important areas where women are ahead of us. One shouldn't, of course, generalize too much here. I'm of the opinion that men and women should have the same rights. But I'm also persuaded that men and women are different, and I hope they stay that way. It's more fun.

And with that, I'll tell you a final story. In 1957, after the Russians launched *Sputnik*, I spoke in Washington before a congressional group about the developments in space travel. One of the congressmen asked me if I thought that women should also be astronauts. My answer was, "In my opinion *only* women should be astronauts." And when he asked me why, I said, "Because women weigh less and they have more sense."