ADDRESS TO THE AMERICAN PHYSICAL SOCIETY
New York City, 1969

MY ONLY BROTHER is a cloud physicist. He is nine years older than I am, and was an inspiration to me in my youth. He used to work with the research laboratory of the General Electric Company in Schenectady. Back in his Schenectady days, Bernard was working with Irving Langmuir and Vincent Schaeffer on precipitating certain kinds of clouds as snow or rain–with dry ice or silver iodide, and maybe some other stuff.

He was notorious in Schenectady for having a horrendously messy laboratory. There was a safety officer in the laboratory who called on him regularly, begging him to clean up the death traps all around the room. One day my brother said to him, "If you think this is a mess, you should see what it's like up here." And my brother pointed to his own head. I loved him for that. We love each other very much, even though I am a humanist and he is a physicist.

I am charmed that you should call me in your program notes here a humanist. I have always thought of myself as a paranoid, an overreactor, and a person who makes a questionable living with his mental diseases. Fiction writers are not customarily persons in the best of mental health.

Many of you are physics teachers. I have been a teacher, too. I have taught creative writing. I often wondered what I thought I was doing, teaching creative writing, since the demand for creative writers is very small in this vale of tears. I was perplexed as to what the usefulness of any of the arts might be, with the possible exception of interior decoration. The most positive notion I could come up with was what I call the canary-in-the-coal-mine theory of the arts. This theory argues that artists are useful to society because they are so sensitive. They are supersensitive. They keel over like canaries in coal mines filled with poison gas, long before more robust types realize that any danger is there.

The most useful thing I could do before this meeting today is to keel over. On the other hand, artists are keeling over by the thousands every day and nobody seems to pay the least attention.

If you want an outside opinion on your profession, you hired the wrong man. I've had the same formal education you people have had, more or less. I was a chemistry major in college. H. L. Mencken started out as a chemist. H. G. Wells did, too. My father said he would help to pay for my college education only if I studied something serious. This was in the late Thirties. *Reader's Digest* magazine was in those days celebrating the wonderful things Germans were doing with chemicals. Chemistry was obviously the coming thing. So was German. So I went to Cornell University, and I studied chemistry and German.

Actually, it was very lucky for me as a writer that I studied the physical sciences rather than English. I wrote for my own amusement. There was no kindly English professor to tell me for my own good how awful my writing really was. And there was no professor with the power to order me what to read, either. So reading and writing have been pure pleasure for me. I only read *Madame Bovary* last year. It's a very good book. I had heard that it was.

Back in my days as a chemistry student I used to be quite a technocrat. I used to believe that scientists would corner God and photograph Him in Technicolor by 1951. I used to mock my fraternity brothers at Cornell who were wasting their energies on insubstantial subjects such as sociology and government and history. And literature. I told them that all power in the future would rest properly in the hands of chemists and physicists and engineers. The fraternity brothers knew more about the future and about the uses of power than I did. They are rich and they are powerful now. They all became lawyers.

***

You have summoned me here in my sunset years as a writer. I am forty-six. F. Scott Fitzgerald was dead when he was my age. So was Anton Chekhov. So was D. H. Lawrence. So was George Orwell, a man I admire almost more than any other man. Physicists live longer than writers, by and large. Copernicus died at seventy. Galileo died at seventy-eight. Isaac Newton died at eighty-five. They lived that long even before the discovery of all the miracles of modern medicine. Think of how much longer they might have lived with heart transplants.

You have called me a humanist, and I have looked into humanism some, and I have found that a humanist is a person

who is tremendously interested in human beings. My dog is a humanist. His name is Sandy. He is a sheep dog. I know that Sandy is a dud name for a sheep dog, but there it is.

One day when I was a teacher of creative writing at the University of lowa, in lowa City, I realized that Sandy had never seen a truly large carnivore. He had never smelled one, either. I assumed that he would be thrilled out of his wits. So I took him to a small zoo they had in lowa City to see two black bears in a cage.

"Hey, Sandy," I said to him on the way to the zoo, "wait till you see. Wait till you smell." Those bears didn't interest him at all, even though they were only three inches away. The stink was enough to knock me over. But Sandy didn't seem to notice. He was too busy watching people.

Most people are mainly interested in people, too. Or that has been my experience in the writing game. That's why it was so intelligent of us to send human beings to the moon instead of instruments. Most people aren't very interested in instruments. One of the things that I tell beginning writers is this: "If you describe a landscape, or a cityscape, or a seascape, always be sure to put a human figure somewhere in the scene. Why? Because readers are human beings, mostly interested in human beings. People are humanists. *Most* of them are humanists, that is."

Shortly before coming to this meeting from Cape Cod, I received this letter:

Dear Mr.Vonnegut,

I saw with interest the announcement of the talk entitled "The Virtuous Scientist,' to be delivered by you and Eames and Drexler at the New York A.P.S. meeting. Unfortunately, I will not be present at the New York meeting this year. However, as a humanistic physicist, I would very much appreciate receiving a copy of the talk. Thanking you in advance.

Sincerely,
GEORGE F. NORWOOD, JR.,
assistant professor of physics,
University of Miami,
Coral Gables, Florida.

If Professor Norwood really is a humanistic physicist, then he is exactly my idea of what a virtuous physicist should be. A virtuous physicist is a humanistic physicist. Being a humanistic

physicist, incidentally, is a good way to get two Nobel Prizes instead of one. What does a humanistic physicist do? Why, he watches people, listens to them, thinks about them, wishes them and their planet well. He wouldn't knowingly hurt people. He wouldn't knowingly
help politicians or soldiers hurt people. If he comes across a technique that would obviously hurt people, he keeps it to himself. He knows that a scientist can be an accessory to murder most foul. That's simple enough, surely. That's surely clear.

***

I was invited here, I think, mostly because of a book of mine called *Cat's Cradle*. It is still in print, so if you rush out to buy it, you will not be disappointed. It is about an old-fashioned scientist who isn't interested in people. In the midst of a terrible family argument, he asks a question about turtles. Nobody has been talking about turtles. But the old man suddenly wants to know: When turtles pull in their heads, do their spines buckle or contract?

This absentminded old man, who doesn't give a damn for people, discovers a form of ice which is stable at room temperature. He dies, and some idiots get possession of the substance, which I call Ice-9. The idiots eventually drop some of the stuff into the sea, and the waters of the earth freeze and that is the end of life on earth as we know it.

I got this lovely idea while I was working as a public-relations man at General Electric. I used to write publicity releases about the research laboratory there, where my brother worked. While there, I heard a story about a visit H. G. Wells had made to the laboratory in the early Thirties.

General Electric was alarmed by the news of his coming, because they did not know how to entertain him. The company told Irving Langmuir, who was a most important man in Schenectady, the only Nobel Prize winner in private industry, that he was going to have to entertain Wells. Langmuir didn't want to do it, but he dutifully tried to imagine diversions that would delight Mr. Wells. He made up a science-fiction story he hoped Mr. Wells would want to write. It was about a form of ice which was stable at room temperature. Mr. Wells was not stimulated by the story. He later died, and so did Langmuir. After Langmuir died, I thought to myself, well, I think maybe I'll write a story.

While I was writing that story about Ice-9, I happened to go to a cocktail party where I was introduced to crystallographer. I told him about this ice which was stable at room temperature. He put his cocktail glass on the mantelpiece. He sat down in an easy chair in the corner. He did not speak to anyone or change expression for half an hour. Then he got up, came back over to the mantelpiece, and picked up his cocktail glass, and he said to me, "Nope.” Ice-9 was impossible.

Be that as it may, other scientific developments have been almost that horrible. The idea of Ice-9 had a certain moral validity at any rate, even though scientifically it had to be pure bunk.

***

I have already called the fictitious inventor of the fictitious Ice-9 an old-fashioned sort of scientist. There used to be a lot of morally innocent scientists like him. No more. Younger scientists are extremely sensitive to the moral implications of all they do. My fictitious old-time scientist asked, among other things, this question: "What is sin?" He asked that question mockingly as though the concept of sin were as obsolete as plate armor. Young scientists, it seems to me, are fascinated by the idea of sin. They perceive it as anything human that seriously threatens the planet and the life thereon.

While I was working at General Electric, long after the Second World War, the older scientists were generally serene, but the younger ones were frequently upset. The young ones were eager to discuss the question as to whether the atomic bomb, for instance, was a sin or not.

David Lilienthal, the first chairman of the Atomic Energy Commission, said he was going to resign his job in order to speak freely, and scientists at General Electric banded together to ask Lilienthal to come to Schenectady Schenectady to speak to them. They wanted to hear what he had to say about the bomb, now that he was free to say what he pleased. Lilienthal accepted. The young scientists hired a movie theater. It was jammed the night when Lilienthal agreed to speak so freely, to gush.

The audience was silent and thrilled and frightened and awed and hopeful. Lilienthal's opening statement, as I recall it, was this: “First of all, let me say that I see no point in wallowing in misery.” Then he told the scientists and their wives, their young wives, about all the wonderful benefits that peacetime

uses of atomic energy were going to bring. He told about a ball bearing which was coated with a radioactive isotope and then rolled down a trough. Thanks to atomic energy, minute measurements of the wear and tear on both the ball bearing and the trough could be made. He told, too, about his egg man, who had a malignant throat tumor the size and shape of a summer squash. This man, who was about to die, was urged to drink an atomic cocktail. The tumor disappeared entirely in a matter of days. The egg man died anyway. But Lilienthal and others like him found the experiment encouraging in the extreme.

I have never seen a more depressed audience leaving a theater. *The Diary of Anne Frank* was a lighthearted comedy when compared with Lilienthal's performance for that particular audience, on that particular night, in that particular city, where science was king. The young scientists and their young wives had learned something which most scientists now realize: that their bosses are not necessarily sensitive or moral or imaginative men. Ask Wernher Von Braun. His boss had him firing rockets at London.

The old-fashioned scientist I described in *Cat's Cradle* was the product of a great depression and of World War Two and some other things, of course. The mood of technical people in World War Two can be expressed in slogans such as "Can Do!" and "The difficult we do right away; the impossible takes a little longer!”

The Second World War Was a war against pure evil. I mean that seriously. There was never any need to moralize. Nothing was too horrible to do to any enemy that vile. This moral certainty and the heartlessness it encouraged did not necessarily subside when the war was won. Virtuous scientists, however, stopped saying “Can do!”

***

I don't find this particularly congenial, moralizing up here. Moralizing hasn't really been my style up to now. But people, university people in particular, seem to be demanding more and more that persons who lecture to them put morals at the end of their lectures.

One of the greatest public-speaking failures of my career took place last summer at Valparaiso University in Indiana, where I addressed a convention of editors of college newspapers. I said many screamingly funny things, but the applause was

dismal at the end. During the evening I asked one of my hosts in what way I had offended the audience. He replied that they had hoped I would moralize. They had hired me as a moralist.

So now when I speak to students, I do moralize. I tell them not to take more than they need, not to be greedy. I tell them not to kill, even in self-defense. I tell them not to pollute water or the atmosphere. I tell them not to raid the public treasury. I tell them not to work for people who pollute water or the atmosphere, or who raid the public treasury. I tell them not to commit war crimes or to help others to commit war crimes. These morals go over very well. They are, of course, echoes of what the young say to themselves.

I had a friend from Schenectady visit me recently, and he asked me this, “Why are fewer and fewer young Americans going into science each year?" I told him that the young were impressed by the war crimes trials at Nuremberg. They were afraid that careers in science could all too easily lead to the commission of war crimes. They don't want to work on the development of new weapons. They don't want to make discoveries which will lead to improved weapons. They don't want to work for corporations that pollute water or atmosphere or raid the public treasury. So they go into other fields. They become physicists who are so virtuous that they don't go into physics at all.

At the University of Michigan, at Ann Arbor, the students have been raising hell about the university doing secret Government work. I got to talking to some of the students about the protests that have been made against the recruiters for Dow Chemical, manufacturers of napalm among other things. I offered the opinion that an attack on a Dow recruiter was about as significant as an attack on the doorman or theater usher. I didn't think the recruiter stood for anything.

I called attention to the fact that during the Dow protest at Harvard a couple of years back, the actual inventor of napalm was able to circulate through the crowd of protestors unmolested. I didn't find the fact that he was unmolested reprehensible. I saw it as a moral curiosity, though I did not mean to suggest to students at Ann Arbor that the inventor of napalm should have been given one hell of a time. I wasn't sure what I thought.

The next day I received a letter which said this:

> Dear Mr. Vonnegut,

> I heard you talk at the Canterbury house yesterday, and I must admit that I was struck by your question about Louis Fieser, who was allowed to wander unmolested through the Dow demonstration at Harvard. Your question about why students don't protest the scientists who invent weapons is valid and troublesome. I can only answer that I think we should. But do you know Louis Fieser? I don't know him personally, but I was at Harvard until this year and I have heard the old man lecture in organic chemistry. From this limited exposure and from the response of others to him in his late years, I can only suspect that a protest would be lost on him. He is a very funny and lovable man in the lecture room. I don't imagine he would understand a protest. And his personality leaves an imprint that makes it hard to use him as a symbol, In contrast, Dow representatives are such nicely impersonal representative products of the system that they are easy to protest against both immediately and symbolically.

There ends the letter.

This letter helped me to see that Dr. Fieser and other old-fashioned scientists like him were and are as innocent as Adam and Eve. There was nothing at all sinful in Dr. Fieser's creation of napalm. Scientists will never be so innocent again. Any young scientist, by contrast, when asked by the military to create a terror weapon on the order of napalm, is bound to suspect that he may be committing modern sin. God bless him for that.