

Autobiography Of The Bomb

(9/12/22)

By Jim Shankman

Copyright © 2021 Jim Shankman

123 West 88th Street, #4F

New York,

NY 10024

914-414-9285

jimshankman@gmail.com

Publisher's Disclaimer

This is a work of historical fiction. Any resemblance to persons living or dead is pretty much unavoidable. Only the names have not been changed to save you the trouble.

What did you do in the war, Daddy?

Rutherford: I invented the atom.

Einstein: I discovered the universe.

Bohr: I dismantled reality.

Part One

Chapter One

The Infancy Gospels

You may think you know me but you don't. Our acquaintance only goes so far. You see how I act, but you do not know my thoughts and feelings. You do not know me from the inside. And so I often feel misunderstood and unfairly judged. You can infer a great deal about a person from their actions. But literature confers one great advantage over life. It allows you to see a person as if from within. Perhaps this is only an illusion. Only the philosophers can answer that. The Buddhists say the mind is an illusion just as the world is an illusion. That does not speak to my condition, as the beatniks say. Indeed I find it kind of insulting.

So allow me to tell you a story. For the most part, I will let the characters in this story speak for themselves. I say characters as if they were not real people, but they are. Only you must consider this. No story can tell the whole truth. The purpose of a story is to make sense out of the chaos of facts. In the process it turns people into characters. That is not a bad thing. On the contrary. So.

As Leo Szilard stepped off the curb at Piccadilly Circus a nuclear weapon exploded in his mind and incinerated the future of the human race. In the unspeakable gravity of the moment,

time stopped still and the world considered its options.

A tiny, almost negligible change in the course of events can have a catastrophic effect on the future. The world can travel along any one of a number of different routes and still end up in much the same place. If Einstein hadn't invented the Special Theory of Relativity, Henri Poincare would have done it soon enough. If James Watt hadn't perfected the steam engine there were others right behind. If Leo Szilard were to walk away from his epiphany, wouldn't some other bright young fellow walk his way into it soon enough in some other European city on some other crowded street? Or would the moment pass, submerge beneath the conscious mind of science only to be forgotten, and leave the nations of Europe content to bludgeon their armies of young men to death with only gunpowder and steel projectiles on the battlefield?

By the time Leo's foot touched the street in Piccadilly Circus, he had triggered a chain reaction of scientific invention that would bring the atom bomb into being. His apprenticeship to the bomb had begun. He would soon become a journeyman and then a master craftsman.

At a quiet coffee shop in Russell Square I sipped a demitasse of hard, dark espresso from a ceramic cup. Impossible place, London. I had been hunting for weeks for a simple cup of coffee. As I spoke to my companion, Otto, I felt a maddening irritation at a hard-to-reach place in my mind, an intellectual itch I needed to scratch.

“Hitler has thrown us out, Otto,” I said.

“Hitler has set us free, Leo”

“Possibly. Possibly. At any rate I want to work. I have got to work. I cannot sit in this wet English air and sip their insipid coffee every afternoon. It will drive me to drink.” I lowered my voice and spoke too quietly almost to be heard. “You know, I had a most remarkable thought yesterday.”

“Excuse me, Leo, but you look like hell. Is something wrong?”

“Yes, something is wrong. Something is terribly wrong. Tremendously wrong.”

“Well what is it? Can you tell me? Otto smoothed his napkin in his lap and toyed with a spoon.

I sighed and my breath caught in my chest. “As I said, I had the most remarkable thought yesterday.”

“Ah, so you do not wish to tell me. I understand, my friend. Tell me your most remarkable thought.”

“I am telling you if you will listen.”

“You are telling me what’s wrong? Or you are telling me your most remarkable thought?”

“I am telling you both for god’s sake.”

“Very well. I am listening.” Otto crossed his legs to one side as if he suspected this might take a while.

“Well you see it went like this...”

“Oh is it a dream? Are you telling me a dream? I have very little time for dreams now that they have been wrenched from the hearth of folk lore and fairy tale and dropped onto the chaise longue of Mr. Freud’s Viennese unconscious.”

Otto waited for an acknowledgment of his well-turned phrase, but I had no time for that. “No I am not telling you a dream. I am telling you this most remarkable thought I had and why I look like hell!”

“I’m sorry, old man. Proceed.”

And I proceeded to explain to my companion as I sipped the acid black liquid how the world might be destroyed scientifically. “They have found the neutron, Otto. They have found it!”

“Found it. You mean it has been hiding?”

“They have proved its existence. The neutron! The neutral particle that can penetrate the electron shell around an atom and strike at the nucleus.”

“Well bully for them. Whoever they are,” said Otto.

“My god man, don’t you understand?”

“Yes, Leo, I understand. I have been to school. I have studied atomic physics. But it does not keep me up at night.”

I felt myself grow sad and my eyes began to sting. I reached for a white handkerchief from my back pocket and dabbed the corners of my eyes in order to give myself time to control my feelings.

“Dear Leo, I am dumbfounded. You speak of physics, but there are tears in your eyes. Are you sure you are quite alright?”

“If you mean, am I in my right mind. I must tell you I have no idea. I only know I must tell you this thought of mine before it drives me utterly mad!”

“Then do so at once!”

“The point is they have split the atom.”

“Leo, this is old news. You are making no sense to me.”

“But there is new news. “

“There is new news from the old court? My dear man, tell me this new news.”

“Are you quoting Shakespeare at me, Otto?”

“Is it Shakespeare? I thought it was Racine.”

“Very well, I shall find someone else to whom I can tell my troubles. You are clearly of no use to me.”

“No, Leo. I am merely trying to cheer you up.”

“They have bombarded the nucleus of lithium atoms with a beam of neutrons. This fellow Chadwick at Cambridge. They have bombarded lithium releasing a tiny packet of energy. And along with this burst of energy they have produced a brand new neutron streaming out of the atom. Which can then go on and bombard another atom.”

“They have?”

Yes, by god, they have!”

“Ah, how elegant. A lovely result. I am really very impressed.”

“Are you indeed?”

And here I took a pen out of my coat pocket and did a set of calculations which involved the conversion of matter into energy using Einstein’s quaint but useful equation. Quickly, for Otto’s sake, I arrived at the exact amount of energy emitted by the splitting of one atom of lithium through the surgical strike of a neutron at its nucleus.

“And this is why you look like hell, Leo? Why you have dark circles under your eyes? Why your tie clashes so dreadfully with your shirt and your coat? Why there are food stains on your sleeve? Why your eyes dart about like the eyes of a criminal?”

“You do not understand, Otto!”

“What, Leo? What do I not understand? Enlighten me.”

I lowered my chin to my chest and spoke as quietly as I could. “There is a distinct possibility... now just hear me out...a distinct possibility that when you split an atom with a neutron you produce TWO NEUTRONS! TWO!” My chin began to rise.

“Well what of it?”

“And those TWO neutrons then split two atoms creating FOUR neutrons. And those four neutrons then split four atoms creating EIGHT neutrons.” I looked Otto straight in the eye.

“And it goes on and on like a chain reaction until you have split a BILLION atoms and released a billion packets of energy.” I waved the piece of paper with my calculation in the air like a

white flag of surrender. “And then a BILLION SQUARED atoms. Is there a name for this number? I do not know.”

“It is called ten quintillions, Leo.”

“Thank you, Otto. Releasing ten quintillion packets of energy.” My chin rose still further and the pitch of my voice rose and its timbre grew thin as my neck tightened.

“Ah.” The smile on Otto’s face tightened into a grimace. He turned his head to the side as if he had received a blow or bad news of a lover.

“You will have created an explosion with more destructive power than all the bombs detonated in the Great War.”

“Enough to destroy cities?” Otto leaned forward as if he might grab me by the collar in order to steady himself.

“Enough to destroy all of Europe! Enough to bomb it right off the face of the earth and leave a smoking radioactive crater where a two-thousand-year-old civilization once thrived.

“Who would dare to do such a thing? No one in his right mind...”

“Hitler, Leo, that little pig Hitler! That strutting peacock, murderous, little jumped-up tin soldier Hitler!”

Otto fell back in his chair and looked up at the heavens.

“Yes, Otto. Precisely.”

“Let’s find a pub, Leo. I need a drink. I need several drinks.”

“You see my point, Otto.”

“Yes, we must stop it. We must ban the research. Prevent it from proceeding. It is far too dangerous.”

“No, Otto. You have misunderstood.” I shook my weary head. “You are making unwarranted assumptions like a schoolboy on an essay test.”

Otto examined my face for signs of idiocy or stroke.

I wondered whether I should continue or stop now. I spoke almost to myself.

“Rutherford and Chadwick, they run around their Cambridge lab, they have minions, they have trolls, they have funding. If they want to build an apparatus, it is built before you know it. What have I got? I barely have a roof over my head here in London. I go begging hat in hand. “Give me a job in your research lab.” Or, “Give me some money for my own lab.” I could work wonders, Otto. I have good ideas in my head.

“Leo, are you saying...”

“Yes I am saying! I want to split their godforsaken atom. I want to engineer this chain reaction. So I can walk into the Prime Minister’s office and say, ‘Here you are, my good man. Here is a bomb for you. Here is a weapon you can use on the bloody Germans if they fail to mind their piggish Nazi manners.’ They have thrown me out of Berlin. And not just me. All of us. Von Neuman. Pauli. Einstein has left. Edward Teller!”

(Did I hear my name? Is that my cue? Am I summoned to speak? Perhaps not yet.)

“They have thrown me out too, Leo.”

“Of course they have. We are all in the same boat. I want to find this chain reaction. I want to be the one. It is nearly driving me crazy.”

“Perhaps it does not exist. Perhaps it is only a nightmare vision from which you will awaken and then you can get on with your life.”

“I do not think it is safe to think like that, Otto. I think that is a dangerous thought.” I sat quietly for a moment and then I could feel my face light up. “Otto, I shall file a patent!”

“Leo, sit here with me and drink your coffee. I think perhaps you need to see a doctor.”

“No, I shall file a patent on this chain reaction of neutrons! I shall own the rights. And then I may do as I please with it. Give it to the King of England, sell it to the highest bidder or put it in a safe and throw away the key.”

“Are you out of your mind? You think you can patent an atomic particle? It is a force of Nature. It does not belong to you. It belongs to the world.”

If Nobel could patent his TNT then I can patent my neutron reaction. That is the beauty of capitalism. Everything is for sale.”

“I think you are mad.”

I jumped up from the table. I stood on my toes and raised my fists in triumph. “Excuse me, my good fellow, I must go home now and get to work!”

In my rooms in the Imperial Hotel I sat in the bath for hours on end thinking about the phenomenon of neutron bombardment and the requirements for a nuclear chain reaction. I ate only when necessary and walked only occasionally in the wet air that seemed to encase the British Museum and Bloomsbury, picking up a newspaper every now and then to read of the poison cloud descending over Germany.

When he was ten there was something of the colt about him, something in his elbows and his knees, something unsteady and out of proportion. Anyone who knew horses might have looked at him and said, “That one will grow into his legs and his arms. That one will be more than quick. He will be fast. He will have strength and endurance. He will win races. Put your money on that one.” In fact, he still had that something of the colt about him and he suspected he always would, but he did race and he did win. He was long and lean and fast and he knew how to run.

They lived in New York City in an apartment overlooking the Hudson on Riverside Drive. Light poured in from New Jersey in the last afternoon and lit up the hothouse rooms where his parents forced the orchid of his mind. On long walks through Central Park his father would point out the most unusual rock formations and he would explain their geology to him. One day on the Fifth Avenue side he pointed out the Russian Consulate, the most expensive piece of real estate in the possession of the Tsar, according to his father.

“More expensive than the Kremlin?” he asked. He could tell his father was impressed that he knew what the Kremlin was.

“The Kremlin,” he said, “is not a liquid asset, Robert. It cannot be sold.”

Mr. Oppenheimer was not altogether wrong, but the Kremlin was soon to change hands and the price would be astronomical.

When he was eighteen, his father sent him to New Mexico to a horse ranch where city slickers learned to ride. And oh was he a city slicker. He could read Greek and quote from Euripides. He could read Latin and quote Augustine, but he couldn't read a word of Hebrew. He scarcely knew the alphabet. His father wanted nothing to do with the synagogue or the rabbis. There was only so much time in a day, he would say. The Talmud will swallow you whole, Robert. What was it, a sea monster? He suspected it was a book, but he never got near one till he got to Harvard.

He always felt he might be extraordinary. In his bedroom since boyhood he had strange fantasies, almost mythological fantasies in which he was called by God to do some great deed, to burst forth upon the world and dazzle it in light. By the time he finished high school he was seething with it. What would he do? What would be his calling? He had to know and get to work. Why would anyone love him or care about him, why would he love or care about himself if he didn't achieve something great, if he couldn't be the best there ever was? For then he would be mediocre. He would drown in humdrum anonymity. That was a suffocating fate he wished desperately to avoid. He would change the course of rivers, build airships, conquer

diseases. He needed to grab the world by the collar so it would stop in its track and turn and see him, embrace him, cherish him.

And then he got sick. Senior Year at the Ethical Culture School. He had his appendix out. And then came dysentery and colitis. Rail thin, he spent the spring and most of the summer after high school lying on the couch of the front parlor, baking in the sunshine, drifting in and out of coherent thought. Six feet tall, he was down to a hundred and fifteen pounds. "I can see right through him," his mother said. When his body went completely still, he could feel himself browning in the oven of the day. It was exquisite, although he didn't quite comprehend it at the time. He didn't comprehend much at the time except that he'd been very sick. He sailed away into the heat of the sun and dreamed he'd never come back.

So his father sent him out west with Mr. Smith, his favorite professor from the Ethical Culture School, who had a look in his eye when he read Latin poetry. He couldn't say what it was but he knew Smith had depths. He had a habit of stopping at his desk as he handed back assignments, not stopping but lingering just long enough for him to know he was lingering as if there was something Smith wanted to say about the paper or about him or about them, the two smartest fellows in the room. Not that he ever did.

The sandy soil of New Mexico carpeted the bright Southwestern world. The prairie bloomed with the slightest provocation of rain. The scent of creosote brush sweetened the desert air. The horses seemed as handsome to him as men. They were mostly silent and they shimmered in the light that poured down out of the heavens like honey. They worked hard and kept their counsel. He wanted to be a man like that. He wanted to run with the pack, but he

feared he would always be a solitary wanderer. He was a thinker, a worrier, an angst-ridden hypochondriac. Father, he wanted to shout, my lungs will fail. The heat will take my wits. They will find me lying across the bare back of some bewildered horse as it wanders in the canyons. He felt certain there were canyons in New Mexico. I will be stricken with sunstroke and thirst. I am too tall for horses. I am made of twigs and they are tree trunks. My wrists will snap right off my arms. My knees will fracture where they collide. A first-class hypochondriac, a prize winner.

At first he was frantic. What was he doing here? There was no life here, only the useless passage of time. He had to get back. He had to get started. He had to get going. He was in a panic.

Smith and he shared a cabin at the ranch which was in the Sangre de Cristos Mountains. Two cots, two chairs, a sturdy table, a sink and a mirror. The walls were bare except for a single painted tin image of a saint, *a retablo*. He examined the saint closely at some point. He slouched simply but elegantly in his golden finery with arms outstretched, beckoning to the world it seemed to him. He had the odd feeling that in spite of his composure this saint was in agony. He studied his face. Was he sweet or sullen? Would he save men for their kindness or destroy them or their wickedness? His eyes wandered up to the heavens as if he were expecting something. Resurrection? Damnation? How did he know so much about Catholic theology? He had read a lot of Latin and Greek. It came with the subject matter. And then he noticed his hands weren't just outspread. They were nailed to a wooden cross. Well, that explained a lot. Maybe too much. He liked him better before he knew who he was. He was an odd intrusion into the manliness and good health that ran rampant at the ranch, but somehow He belonged.

Slowly but surely Smith got him eating. Frijoles and green chili rellenos. You saw the chilis drying in the eaves of every home in the state. The women grew them in the yard, dried them on hooks and cooked them into a thick steaming hot sauce. He began to feel his strength coming back. Smith didn't call him Bob. He didn't call him Bobby. He didn't even call him Robert. He called him Oppenheimer as if he were still sitting in his classroom reading out a tricky passage from Catullus. And one day he called him Smith instead of Mr. Smith. He saw him smile.

Smith sat quite erect at the table but he coiled forward like a cat when he brought the fork to his mouth. Sometimes they wore t-shirts at the table. Sometimes they didn't bother with shirts. His eyes were sad but sharp. He didn't so much smile as wince. He had never seen a grown man's body like this so close, so intimate. Smith charged the room with the glow of his skin, but it was all feeling and instinctive reaction to a male animal in his immediate presence.

"You starting to like it out here, Oppenheimer? You glad we came?" He slurped green chili sauce off his fingers at the end of a meal.

"I think I am, Smith." It was the right thing to say, but it didn't feel entirely wrong. "I would like to go hunting with this man," he heard myself saying in his head. Odd thought.

Smith got him chopping wood for the camp cooking fire. How to saw the logs into hearthsized lengths, the two-man rhythm of it.

"That's it Oppenheimer. You have to get into a beat with me."

"You go too fast!"

“We have to feel it out together.”

“I’m trying!” His elbows ached. His shoulders tightened. He was breathing deep into his chest. He watched Smith’s sweaty hands gripping and regripping the wooden handle of the crosscut saw as they ripped their way through the soft pine wood.

“They call it log bucking,” he said for no good reason. They stopped to wipe their brows. Smith wiped his forehead and his neck with a kerchief from his back pocket and held it out to him. He smelled Smith on it as he put it to the hollow of my neck.

He taught him how to wield a safe and neighborly ax. He taught him where to place the log in front of his feet so he didn’t slice off a toe when he did. How to split a log efficiently, all the little tricks the steel head knew about the seams and the knots in the wood.

And he got him up on a horse. The first time he slung his foot into the stirrup, swung his leg over that animal’s back and sat up in the saddle he felt a little bit drunk. He thought he must be pretty damn impressive for a boy on his way to Harvard in the fall. By now he had a lovely nutbrown tan on his face and upper body. His wide bony shoulders settled into their sockets for the first time and he stopped hunching and scrunching to hide his height. He stood up and looked around. Mighty fine, he said. Mighty fine to be alive.

In the late light before dusk a whole pack of them would thunder out into the desert like a vigilante posse in a Tom Mix western, although the well-trained horses stayed in a tight pack no matter how hard he tried to split his off from the trail. Which he liked. He had no illusions about being a horseman and it allowed him to indulge his cowboy imagination in ways that made him blush to think about. They hooped and hollered, sweated and panted, dismounted to smoke

cigarettes, swatted the dust from their jeans with their fine new hats and they eyed the fine ladies who had come to the ranch with their well-to-do husbands and their shy daughters, oh yes indeed they did. The women were handsome and healthy and he had a pretty good suspicion what you were supposed to do with them, but he hadn't a clue how to accomplish the thing.

And so he added the life of the body to the life of the mind.

“Oppenheimer,” Smith said one morning at the breakfast table and he knew something was coming. He was sopping up the last of the egg yolk and green chili on his plate with a rough slice of bread that looked like it had been hewn from the loaf with that crosscut saw.

“Your father asked me to escort you out here and I said yes. Do you know why I said yes?”

“Smith, I assumed it was because you wanted to see the desert and ride the wild horses.” He had a bit of a mouth on him already.

“No, it was because of you, Oppenheimer. I have a strong feeling about you.”

“What kind of feeling?” He knew already. They all had their feelings about him. He was smart, they all said. He was preternaturally smart. He was more than a schoolboy. He was a scholar. He was serious. He had a future. Did he know it? they all asked. Did he know how far he might go?

“I want you to get up there to Harvard and take that place by storm. This is not high school anymore. You don't learn what they tell you to learn. You learn what you want to learn. It's your business now and not theirs. I have a ton of confidence in you. You might even call it

an admiration for you. Man to man, I'm saying this. I want you to know that. But you have to set your mind to it. It doesn't just happen to you. You could be great." Smith sat back at the table and winced. He couldn't tell if it was relief or embarrassment.

"You came all the way out here to tell me this?" Honestly, he had a lot of nerve for a seventeen-year-old. Somebody needed to smack him. But he cracked wise because he was uncomfortable. He had no idea how to say, "Thank you, Smith." Although he knew he should.

"Let's put it this way," Smith replied with great patience. "You are like a gyroscope. When you spin fast, you spin true and nothing can knock you down. You've been sick. You had a rough go. I wanted to get you in my hands and get you spinning true again."

He couldn't speak. There was something in his throat. He had no idea how the words might sound, so he kept them to himself. As he sat there with Smith, his whole head sweating from the heat of the breakfast, he thought, yes, he was meant to be extraordinary or why did they all say it, why did he sense it so strongly. He had to be extraordinary, or why live? Why put up with the indignity of life if you couldn't take it as your prize. That was the first time he admitted it to himself. And that is where his true struggle with life began. But it also had something to do with Smith. He wanted to win his admiration, his affection, his love. That he did not dare admit to himself.

Katharine who ran the ranch was a daughter of New Mexican aristocracy. She took him in hand and taught him about horses. He was already an excellent sailor. He sailed a twenty-eight-foot sloop all over Long Island Sound where thousands of Yankee sailors had lost their lives. Wind, rain and currents were all changeable there. He learned to sail beyond the edge of

danger where the realm of misfortune was an easy reach. But he knew his skills and he knew his craft. The dangers of the ocean unleashed him from the hidden inner teenager he had become. No one could provoke him at school, nor anyone at home, but on the Sound he was transformed by the sea into another Robert, almost unhinged, the wild counterpart to his brooding scholarly schoolboy self. Katharine took him into the Sangre de Cristos, to the high country, to the canyons and the mesas, to the frigid mountain passes ten thousand feet above sea level where the weather was equally treacherous. She was a long lovely lady whose husband lived for his bank in Chicago, while she lived for herself in her sprawling adobe home on the Pecos River. They rode endlessly, often for days at a time through the high country. She led him over a pass one day to a slender desert mesa seven thousand feet above the sea where the cottonwood trees crowded the mountainsides. “Los Alamos is the Spanish for cottonwood,” she said. Entrancing, austere, cut off from the world by a moat of mountain air a thousand feet deep, Los Alamos was the home of a boys’ school for rich kids like him, a log cabin mansion where the boys slept with their horses. He had no desire to attend. He was off to Harvard soon enough. But he did fall in love. And he knew he would come back. You come back when it’s love. That’s what they all said.

Rutherford lay in the dark of his long last nights. He knew it was all but **over** without some kind of medical miracle, and he didn’t believe in miracles of that kind. He believed in the

miracle of experimentation when an educated hunch paid off like a Derby winner, when the truth revealed itself momentarily like the lithe body of a fan dancer in a Parisian nightclub. You sat in the dark and watched her perform with her enormous soft fans. She was so swift you weren't really sure if you'd seen it; you couldn't be sure your hypothesis was correct; was she naked beneath those fans? Oh yes she was. The thrill of that.

He recalled his laboratory at McGill trapping alpha particles as they radiated out of radon atoms. He trapped the particles in a glass cylinder where they lit up like helium atoms, proving that alpha radiation was helium minus its electrons. They gave him the Nobel prize for that. In Chemistry, the bastards. The priggish toffee-nosed twits could not bring themselves to give their Physics award to the clever Kiwi farm boy. First he had proved there were two kinds of radiation. Then he had proved that uranium could disintegrate through radioactivity into lead. And then he proved that alpha radiation was helium. "Give him a prize in chemistry. Maybe that will shut him up." It hadn't, not by a long shot. Might as well have given him the Nobel Prize for stamp collecting for all it meant to him. Now they called him the Isaac Newton of Atomic Physics. Soon he would be joining Sir Isaac in the cemetery. Or rather the nave of Westminster Abbey. So he surmised.

These still dark nights in which he could do nothing but prepare himself for the next world, they reminded him of his lab in Manchester where he sat in the cold dark cellar for half an hour each day preparing his eyes to see atomic radiation. Only when your pupils had grown fat and accustomed to the dark, only then could you see the telltale tracks of the particles as they flashed by for a split second one by one like distant comets, starry messengers of the New Science, only then could you note the curve of their trajectories and guess at the forces that

affected them. Yes, he guessed. Science was a flash of insight, the game of guesswork followed by the tedium of proof.

Geiger, his useful German, a clever fellow, he had built a device that *listened* for radiation. Each time an alpha particle entered the chamber, its energetic flight registered as a click. So you could count the clicks one by one as the particles were generated by radioactive radon. It was so simple it was beautiful. Rutherford liked that.

Normally the Germans were far too sophisticated and arrogant to look for simple solutions. They all had Kant and Hegel in their blood. They could theorize; they could pontificate; they could bicker over blueprints for the architecture of the Sensible Realm; but they couldn't build experiments like a farm boy. Not really a farmboy, no, but he had milked his share of cows and driven sheep to pasture. He learned the business of making linen from flax at his father's mill. Cotton and wool production had been mechanized by the Brits, but not the production of linen. The flax plant was too complicated. You didn't run it through a gin or boil it in a vat. The stalk could not be cut with a thresher. It had to be pulled gently from the soil intact in order to save the sap. You had to rip away the seeds and soak the wood stalk in order to soften it, then peel away the stalk to reveal the shining fibers. You had to do it on a day with no breeze so that the seeds didn't fly away. He learned the pulling, the stooking, the rippling, the retting, the breaking and the scutching. He wanted to see if he could mechanize the process. His ideas were inventive enough to merit his father's encouragement, but not enough to replace the workers. No steam-hammer here to throw John Henry out of work or break him in a competition. In the end he developed an appreciation for the handmade soul of hard work with the hands.

But Rutherford had wanted to *see* not *hear* these radioactive particles. So he sat in the dark waiting for nature to reveal her wonders. Now he lay in his hospital bed and waited while his pupils grew large enough to catch a glimpse of eternity.

One seemingly ordinary day he had aimed the stream of alpha particles for no particular reason at a thin strip of gold foil and some had caromed off the foil at a 90-degree angle. He was shocked. He was stunned. This could not be. The magnetic energy required to bend an alpha particle by 90 degrees was enormous. How could such an enormous amount of energy be stored in the nucleus of an atom? He had already determined that the nucleus was empty except for a tiny dot of something at the center, like the emptiness of space between the distant stars. A picture began to form in his mind, a vague image without a caption, like a photographic plate slowly developing in a caustic solution. Over the course of a year the image on the plate emerged and he wrote a caption beneath the picture and refined it: the nucleus was a tiny sun whose electrons orbited the nucleus like the planets.

Well yes, he wanted to catch a glimpse of eternity, but what did that mean? He had never given it much thought. He would lose consciousness one day while the nurse pattered about officiously or one evening as he listened to the silence, or one night when the wind in trees picked out the tune. And where would his consciousness go? Given his deep understanding of the forces of nature on the atomic scale, the question never seemed particularly important. It never seemed to be a subject for investigation. And now it seemed to be the only thing that really mattered. Why had he never formed a hypothesis, why had he never devised an experiment, constructed an apparatus, come to even an initial conclusion? It was a stunning oversight to him now as he lay almost unaware of his body except for the dim morphine breeze

that promised to sweep him over the horizon. What kind of experiment might that be? What clever well-made but inexpensive device might catch a glimpse of the human soul in its material prison? Did the soul decay? Breakdown? Transmute into something more spiritually stable? Did it give off light like uranium turning to lead?

He knew well enough he was only John the Baptist in this new religion of the atomic. He only prepared the way for the one who had been promised. He had not recognized him at once. There were so many imposters, like that ruddy American chap, Oppenheimer. Perfectly dreadful young man. Wind could bowl him over. Impossibly unhandy. Hopeless. Couldn't tie his shoes. Imagine letting him loose in my laboratory.

And then there was the proton.

He'd finally got back to Cambridge, center of the world for a thousand years. Take note of *that* Mr. Bloody Hitler. You could fall in love with Cambridge. A thousand years of church bells echoed in the stone. A thousand years of learning. The boundless energy of youth, the flagging spirits of middle age, the resignation of the wise old men, the ones that had hung on long enough to really learn something, to get it all into some sort of perspective, long enough to wonder why they had to give it all up, the ones who only hoped they had passed something on to the world besides the words on the page, the formulas and diagrams, not that these were nothing, but you had to breathe life into them by communicating the true spirit of the endeavor, which was not money or power, but the beauty of it all.

It was hard to put into words. Why was he even trying? You knew it when you saw it in yourself, in another man. You wanted the next lot to clamber to the top of The Tower of Babel

with their universal language of science and touch the sky, touch God's face before He dared to scramble their tongues for their insolence! Oh Well! One does grow sentimental near the end. No one can blame you for that.

The proton, yes. There had been more than a whiff of alchemy in that discovery. The transmutation of elements by the hand of man. Could one turn lead into gold and by one's transmutational wits become the richest man on earth? And if so, was immortality not within one's grasp? It was one thing to watch uranium decay. It was quite another thing to bombard nitrogen with alpha particles and turn it into oxygen and hydrogen. That was the kind of thing you only found in hulking parchment manuscripts bound in leather, half decayed into illegibility, written in a gothic script that might be mistaken for the Hebrew of the Old Testament with its curlicues and filaments, peppered throughout with esoteric symbols halfway between geometry and madness, laboriously copied by underpaid scribes who had no idea whether they were reading the revealed word of nature or some credulous nonsense or god forbid blasphemy and their impoverished souls to be damned for all time.

It had been hard to prove that he had turned nitrogen into oxygen. Only one in a million alpha particles hit their mark. The rest bounced off the electron shells or whistled into empty space like a hail of machine-gun fire that couldn't find a Tommy with his Enfield hugging the mud of no man's land.

Bloody Aston, Francis William Aston with his motorcars and motorcycles and fast women and sloe gins fizzing. Sloe gin fizzes. Something like that. He had built a device, a beautiful little thing, prettier than any of his wenches with their rouged knees and their lace

garters and their jeweled pewter flasks. Aston combined magnetic and electrostatic fields, engineered to a fare thee well, and the whole thing serving to identify all the exotic new elements created by this bombardment, oxygen 17 from nitrogen, neon 22 out of fluorine. Brilliant distracted fool. Gave him the prize in '22. The chemistry prize, the infernal twats. God, how we laughed at that. "Chemistry? You call that chemistry?" "That's no more chemistry than a mule." "You lot wouldn't know physics if it peed in your pudding!" "If that's chemistry, I am the sorcerer's apprentice." Of course he was the sorcerer's apprentice. And who was the sorcerer? Bohr was the sorcerer. The '22 Nobel in Physics went to Bohr. Bloody genius, Bohr. Never saw him coming. You stand there in the lake all day baptizing your Jewish brethren in the Sea of Galilee, "Dunk and rise, go in peace." "Dunk and rise, go in peace." "Get your head under or you're wasting my time!" And one day a man walks up and it's you submerge your head for him.

With each collision one stray particle spun away into the ether. We called it a hydrogen atom without its electron. But I saw it for what it was, an elementary particle in its own right, the proton. I got no prize for that. But it gives me the shivers to think of it. How did I ever do it? How did I untangle the mess of facts and see the straight line through that explained it all? Was it really me? Had I been that good? By god I must have been.

Niels remembered the moment it first occurred to him that maybe there is no god. He was fourteen. Maybe he was fifteen. He was walking off the football pitch beside the gymnasium when the words came to him. It didn't stop him in his tracks. He didn't fall to the ground in terror and weep. He did stop walking. His body went still, he screwed up his face for a second, and then he dismissed the thought as silly. He took God very seriously as a schoolboy. It was all very simple and powerful, and he liked that. Not difficult like spelling or vocabulary words. There was nothing to memorize. It was all very clear the way they taught it at school. He was good at God. He was also good with numbers, although his brother Harald was the smart one. That's what they all said. But Niels could multiply big numbers and get the right answer without writing it all down. "How do you do that," his teachers asked with suspicion and envy. "I look at the numbers and I see the answer. Isn't that the right way to do it?" He knew it was the right way. It was better than the way everybody else did it with pencils and erasers, their tongues pressed against their teeth and their palms pasted to their foreheads.

But out there on the horizon of his consciousness the sky was darkening. There was all this confusing talk from loudmouth intellectuals in Copenhagen about the difficulty and dishonesty of faith, and maybe when you thought about it, no don't think about it, don't waste your time. You have better things to do. And what a queer thought anyway. God dead. Provocative nonsense. God can't die. If He can die, He's not God. QED. But that had not been good enough. Look around you, Niels. You're a smart kid. Nothing was as the pastors said. Everybody was saying so, fairly shouting it in the streets.

Some charmless adversary in his mind began to mutter indistinctly. Niels could catch a word here and there but it wasn't so much the words that hit him as it was the guttural sound of

the voice. An atmosphere of dread enveloped him when it rose above the noise of the day and took his attention. It seemed to be behind and him reaching for his throat. He lost his taste for Tolstoy, bought a book by Dostoevsky and made himself not read it. I can live without this book. I know what's in here. Heartache. And there was this new fellow Nietzsche. You read him at your peril, they said. He was the very devil. Or was he the new man? How could opinion be so divided? There was no consensus. He would decide for himself. He would champion God's side of the debate and win the day for Him. He couldn't bear the thought of losing. And then there was Kierkegaard, his countryman, who had retrieved his faith from the armies of science and secularism, who had turned their own weapon, reason, against them and found reason for faith. Hero of the Faith, there was rioting in the cemetery when they laid him to rest. But he hadn't so much as read Kierkegaard as he had lived in Kierkegaard's country

Niels grew quiet in the classroom and sullen at home and he was plagued by crippling doubts. The adversary tightened its grasp on his neck and sunk claws in. He could feel the sickness in his spine like an inflammation. He could feel it on his throat. He woke up school days in a lethargy and couldn't face the day. He hid his face from the school pastor. He could not fill his lungs in church. He fought for air in Theology class. He became a character out of a German novel, a lost soul. He ached. He sickened. He rotted inside.

He told of his torments to no one, but Karl Jakobsen knew something was seriously wrong. They walked along the stone curb by the canal and wandered onto a bridge. Looking down into the water, they leaned their forearms on the wrought iron railing and watched the dark water flow beneath the bridge.

“You’re reading Darwin, aren’t you?” said Karl. “And Nietzsche. I know you are.”

“Maybe. Maybe I just carry them around to make sure no one talks to me.”

What’s the point of that, Niels?”

“Oh, does there have to be a point?”

“No I don’t suppose there does, but I think there is.”

“And what do you suppose it is?”

“You think we are descended from apes?”

“I don’t know about you, but I am.”

“Really? You find that thought appealing?”

Niels shook his head.

“Are you shaking your head no or are you shaking your head at my fearful ecclesiastical innocence?”

“Ecclesiastical innocence? I like that, Karl.” Niels looked Karl in the eye to see if he might be as sharp as he now sounded. Perhaps his brains had grown and he was capable of more than calculus and differential equations. Karl was the only one who could keep up with him in mathematics.

“Everything you say frightens, me,” said Karl. “I hear a viper hissing in everything you say.”

Yes, he thought, that's true. I can hear it in my own voice. I'm not fooling anyone. They all stare at me in the hallways and it's not because I'm six feet tall.

"Karl, I am so sick of it."

Karl did not reply. He let the silence have its way. He didn't know what Niels meant, but he felt the urgency of it.

"Sometimes I think I no longer wish to be."

Karl stared at the river flowing slowly. He cast a sidelong glance at Niels to see if Niels was looking at him. He wasn't. Thank god for that because Karl did not wish to look into that face and see stark anguish, nor did he wish to see a blank deathlike expression on which he might infer even worse.

"But here you are," he finally replied. Gently, Karl. Not to provoke but to empathize somehow. "Alive but maybe not well."

"Am I? I don't think I am."

"What?"

"I'm not alive anymore."

"I beg to differ."

"In what sense am I alive? In the sense that I can taste food? In the sense that I find your strange jokes funny? In the sense that I still admire a pretty girl? Because I can't. And I don't.

Was it the bright sun and the cold wind, or were those tears in Niels' eyes?

“One of the scholastics,” said Karl, “I forget which one, says Philosophy is the road to madness. I never took that seriously.”

“Or possibly madness is the road to Philosophy,” said Niels.

Karl grinned in spite of himself. Niels saw him grin and laughed. They looked at each other a moment deciding whether to go on.

“Would you help me?”

“No! What? Are you out of your mind?”

“Never mind!”

“What do you mean, never mind? How am I supposed to never mind?”

“I didn't mean it.”

“Then why did you say it?”

“I like to think about it.”

“You need to speak to the pastor.”

“The pastor would never understand. He will ask me if I touch myself,”

“Do you?”

“Karl, no! None of your business.”

“I do.”

“Karl, you moron, now I have to tell the minister.”

“I won’t if you won’t,” Karl said with a trace of a sly grin.

“You won’t tell if I won’t tell?” Niels asked, feeling himself beginning to grin as well.

“I will stop masturbating if you will stop thinking about suicide.”

“Ohhh.” Niels thought about that for a moment. “I wonder which is the greater sacrifice.”

They howled with transgressive glee.

“Have we just blasphemed, Niels?”

“There is no God, Karl.”

“Shut up with that stuff!”

“Oh my god, what are you afraid of. It’s my soul, not yours.”

“You think there’s no God but you have a soul?”

“I’m being ironic. Never mind.” And then after a moment. “So what are you reading? How are you staying out of existential trouble?”

“I’m reading this. Karl took a thick worn book out of his satchel. It was Kierkegaard.

Karl found a passage that was underlined and read, “If God held all truth in his right hand, and in the left hand held the lifelong pursuit of it, he would choose the left hand.”

Niels who had been reading along looked up his mouth agape looked up and saw the entire city before him, the Christianborg steeple thrust up in the distance. “Yes, he said. “Yes.” He felt the wind on his face and the low sun in his eyes. He heard distant bells, the sound of the water passing beneath the bridge, the raised voices of sailors on a skiff docked on the quay. “Do you think it takes a whole lifetime, Karl?”

“I think it might take more than a lifetime.”

“I could devote my whole life to discovering the truth. What’s wrong with that?”

“And what if you never get there, Niels? How will you feel at the end, knowing you never got there?”

“You pick it up from the man behind you and hand it off to the man ahead.”

This is how God works?”

“This is how science works, Karl.”

“Oh you are a man of science.”

“Oh you are a man of God.”

“Read some Kierkegaard. It might be good for your soul.”

“Which one should I read?”

Niels got himself a copy of *Either/Or* and read it quickly in his room Friday night by candlelight. Then he read it slowly by the canal with the doves and gulls pecking all around over the weekend. Then he read it very very slowly in his room the following week. As he read the

book, it softened in his hands. It felt good in his hands and it felt good in his heart. Monday morning he found he couldn't leave his room without putting *Either/Or* in his satchel, not to take it out and read it somewhere in secret or ostentatiously in public where he would be noticed, but to have it in his bag, to know it was there if he needed it. Thinking about death no longer comforted him. Thinking about Kierkegaard did. Kierkegaard was more complex, his idea that the church was asking you to place your eternal soul in the hands of a historical relic, a bible, an accident in time, so to speak. Niels was not a man of God and he was not interested in accidents in time. He was interested in the eternal, the mathematical, the scientific. Kierkegaard clarified this for him.

Chapter Two

The Golden Age Of Science

Late morning light streamed into Rutherford's office. The young man sat, no he had managed to crumple himself into the roundback chair. Odd posture thought Rutherford for such a tall strapping fellow.

"We've met before, you say. When have we met?"

Bohr sighed. "No sir," he replied. "Our paths cross but we do not meet."

Rutherford leaned forward instinctively. The young man spoke quite softly, humbly one might say, as if he were in a church and dared not raise his voice. And his English was atrocious. But it wasn't just that. There was something going on with this young man. "All right then, suppose you tell me why you're here."

Bohr's heart leapt. Had he heard that right? Did he ask me why I'm here? "Forgive, sir. What said you?"

"I asked you why you are here. Am I not speaking loud enough? Normally I am accused of a booming voice."

He's asking me why I'm here. "I have no answer, sir."

"I beg your pardon? Could you speak up? I am accustomed to loud conversation, Mr. Bohr. Why have you no answer? It seems obvious to me you are here for a reason. I simply ask that you explain yourself."

"I know not why I am here, sir. And I cannot explain me. Myself. This is why I come to you."

Bohr fell silent. Rutherford fell even more silent. When his students were in an intellectual muddle he liked to let them think their way out of it, out loud if possible, on paper if necessary or on the chalkboard if they had the stuffings for it. This young man was in some other sort of muddle. So he said a brilliant thing, brilliant to the ears of young Bohr, twenty-six and utterly fed up with Cambridge.

"Go on," he said. "Tell me more."

No one had said, “Go on,” to Bohr at Cambridge. No one had paid him the slightest notice. Mr. Thomson, who ran the Cavendish lab, had refused, with a single-minded determination that baffled and frustrated Bohr, to read the paper he had submitted to him. “All right that’s enough of that for now,” was what they said to him at Cambridge.

“I come to try, sir.”

“Right. Why are you here? That is the question.”

“So, this is a question that has preoccupy my thoughts since I am in Gymnasium and I discover the works of Soren Kierkegaard. I had a rough go of it, I believe that is the expression...” Bohr’s spoke English with a Danish accent odd enough to raise smiles on the faces of everyone he met. But he loved English idiom. It had become his passion. He picked it up quite easily even though he murdered the vowels systematically and his grammar was essentially Danish not English.

“Rough go, yes that is good idiomatic English.” Rutherford perked up at this oddly engaging fellow and the heart on his sleeve.

“A rough go, sir. I was to have a crisis of faith, sir. I confess....”

He stopped. He saw a bird that he took for a swan as it glided over the courtyard. “I considered....” He did not know if he could say the words. He did not finish the sentence. He tried another tack. “Why it is we are here, sir?”

“Most of us are here to do physics, Mr. Bohr, but I gather you are speaking otherwise.”

“Yes sir, I speak otherwise. And now it occurs to me, sir, you ask why am I here in this office a student and not why I am here in this earth like all men.”

“I do not wish to limit the interpretation of the question, Bohr. That is not good science.” He smiled. He considered filling and lighting his pipe. He thought perhaps he would wait a bit.

“Do you know Riemann surfaces, sir?” Bohr asked in almost a whisper.

“Are you talking mathematics to me, Bohr?”

“Number theory, sir.”

“My good young fellow, I don’t care a tinker’s cuss for number theory. I am an experimentalist. I design experiments and I construct them. Or rather my rather talented staff of young go-getters construct them. I use numbers to count and measure things. I do not care to think of them as theoretical entities. I am frankly terrified to think that there may be something we don’t know about numbers that requires clarification. What would that mean? Shall we have to go back and revise the addition tables? That way madness lies.”

Bohr got up. He rocked on his heels and bowed his head as he gathered his thoughts.

“So yes but Riemann surfaces give to us a way for to solve a problem with infinite terms and also same with this theory for Kierkegaard on the infinite ego...”

Rutherford’s eyes opened wide, not at all a common event. When his eyes had last opened wide a Nobel Prize was the result. Bohr proceeded to describe his hypothesis that Riemann surfaces might be very useful in sorting out the philosophical and psychological torment of having an ego of infinite parts.

“Yes yes I see. Or rather I fail to see in a manner which I find most intriguing.”

“Thank you, sir,” said Bohr after a long silence. “I think so I have lost you with all that.”

“So you have seen a connection between Kierkegaard and Riemann. What else have you seen Mr. Bohr, that would make you of use to me here at my laboratory at Manchester?” And here Rutherford dipped his pipe into a tin of fresh cut tobacco and packed it so that oxygen would flow through the pipe bowl slowly and evenly when he lit it with a wooden match from his mahogany matchbox. Bohr spoke very quietly at first as he discussed Rutherford’s celebrated picture of the atom as a tiny positive nucleus around which electrons orbited like planets around a sun. His voice grew a bit steadier as he described his misgivings about this picture from an electromagnetic point of view.

“So you see, planets are pulled with their sun by gravitation, not electromagnetism, yes?”

“Indeed, they are, Mr. Bohr, but my electron and my nucleus are pulled with each other by electromagnetism.”

“But the electromagnetic force is infinite amount stronger than gravitation. It is too strong, sir, to allow for your theory of the atom.

“Yes.” Rutherford admitted, “that is theoretically so, but my dear boy what kind of picture to do propose in reply? Do you propose to take us back to Mr. Thompson of Cambridge who pictures the electrons floating about the nucleus like raisins in a plum pudding?”

Bohr wasn't sure if he was kidding.

"I'm kidding!" Rutherford barked.

"I think you must, sir. So follow my think a bit further if you will."

"Oh I will, young Mr. Bohr. I shall follow your think wherever it may lead. I should follow it onto the infinite planes of a Riemann surface, god forgive me, if I thought it would provide me with insight."

"You make fun to me, sir!"

No, Bohr, I am admiring the reach of your intellect."

Bohr sensed something fatherly and forgiving in this man that he had not found anywhere in Cambridge or among English scientists in general for that matter. He found himself raising his voice a bit further as he explained that, "The electromagnetic charge between the nucleus and the electron is so strong that the electron would fall into the nucleus unless it were found to be traveling at enormous speeds around it."

"And why shouldn't the electron travel at enormous speeds around the nucleus?"

"Because, sir!" Bohr spoke quite forcefully now with the urgency of a condemned man with one last chance to earn a reprieve. "Because Maxwell's equations state very much so clear that an electron on a curved path lose energy at a very big rate. Here. I come to show you the formula that predicts this energy loss."

"No no," said Rutherford with grace and good patience, "I will take your word for it. I see where you are leading me."

“What I say, sir, the necessary speed to avoid orbital decay would itself contribute to orbital decay by to slow the electron down at very slow rate and you would to have the electron collapse in the nucleus from the phenomenon you think to avert it.”

Rutherford went to the door of his office and closed it. Oh dear, thought Niels, this is really not going well. “Mr. Bohr, I am not a mathematician. I am a scientist. I do not think mathematically. I think in pictures. I have heard this objection of yours before and my reply is simply this. Until someone can show me a picture that improves upon my orbital picture the way my orbital picture improves up Mr. Bloody Thompson’s picture of bloody raisins floating in a bloody pudding, then I shall stand by my orbital picture till the day I bloody die.”

“Yes, sir I quite understand your position. I think that I say much the same thing to Mr. Thompson at our last meet in Cambridge. I think yes I burn my bridge there. I am at so much a lost now. I had so much excellent prospects when I came to England. I think I must rise like a rocket. I have make a mess of things.” Niels felt his chest giving way. He hadn’t cried since he was a boy playing football and he had soon enough mastered that weakness as he mastered it now. “And so I come to you.”

He means for guidance, doesn’t he? Yes of course he does. Rutherford understood now what the young man had meant when he said he didn’t know why he was here on this earth. Like most ambitious bright young men, he had no clear idea of his own future. Although he could see so much, he could not see his own future and he suffered for it.

“That picture is going to win me the Nobel Prize I so richly deserve once my laboratory of clever young men are able to prove it experimentally once and for all.”

Yes, sir I rather think that was your plan.”

“So here is my offer to you.”

“Yes sir?”

“Join me. Join us. Here at Manchester. You are clever. You are committed. You are not the least bit afraid of me. And I like you. Don’t ask me why. I haven’t the slightest idea. I am not a psychologist. I am an experimental physicist. And I hear you are a first-class goalie.”

“I rather think I will like to *disprove* your theory, Mr. Rutherford, if I am honest.”

“I should rather think you will fail to disprove it and thereby prove it by virtue of the Law of the Excluded Middle which says that a thing is either so or not so and there is nothing in between.

“You are maybe not a mathematician, sir, but you are maybe yes a logician.”

Rutherford held out a large meaty hand to Bohr and said, “I shall take that as a yes! Mr. Bohr, I need a good theory man. These boys of mine can build a cathode ray tube with their front teeth but they can’t explain what it means.”

“Theory is my strong point, sir.”

“Tell me, have you read Kant?”

“I know the *Critique* quite well”

“Dear me. Do you indeed. Hegel?”

“The Science Of Logic and the Phenomenology.”

“Good god, man. Next thing I know you’ll be quoting me Leibniz on monads.”

“I could if you like, sir.”

“I bloody well don’t. But I need a man like you, Bohr. I need an abstract thinker, a synthesizer, a dialectician. A dreamer. The thing is I read your article, the one Thomson seems to have overlooked. I couldn’t make head or tails of it so I gave it to my best man Chadwick. Chadwick said it looked fairly promising but really it was over his head. Over his head, I said. Since when was anything over his head? I asked. This is, he said. Get this fellow down here and let’s have look at him. So I did. And I like what I see. And that is why you are here, Bohr. Not on this earth like all men, but here in my office. Because Thomson is a bloody fool. He let me go, and now he has let you go. And furthermore, they say you are lights out in goal. I need a man like you on my team, Bohr. When Niels grasped Rutherford’s hand, he felt the warmth of the clasp like a caress.

“Stiffen that handshake, young man. By your handshake shall ye know them.” Niels grinned and grasped Rutherford’s hand a bit more tightly.

“Know who, sir?”

Rutherford tightened his grip by way of example. Niels responded.

“You shall know them as your comrades, although that word has gained a rather negative connotation in political theory I believe.”

“I should like to be your comrade, sir. I should bloody well like it.”

“Spoken like an Englishman!” Rutherford grinned magnificently and Bohr felt the warmth in his heart that had deserted him as a teenager. He wondered had he said too much to this kind-hearted man on the subjects of the soul and the atom. In fact he hadn’t said the half of it.

It didn’t take him very long to be of use. In fact he had been nursing a vague notion since he had arrived at Cambridge to work under the frustrating Mr. Thomson. The difficulties with Rutherford’s atomic solar system were apparent, and it occurred to Niels slowly over the course of that year that there might be a solution. Planck had revolutionized thermodynamics with his quantum theory of electromagnetic radiation caused by heat. Einstein had taken Planck’s notion of the quantum and applied it to the photoelectric effect, the propagation of light off a metal surface, a quantum theory of light. Bohr wondered if perhaps there might be a quantum approach to the structure of the atom. At first it was just a vague cloud of a notion, but slowly it began to condense into something more substantial.

His breath was quick and shallow but his mind was at ease. The moon rose higher in the hospital window. He wondered did Bohr know he was on the verge of something magnificent. No not just magnificent, something uncanny and almost godlike. God had created the heavens and the earth with infinite wisdom, but Bohr had teased it out of Him with the human power of inference and some sturdy mathematics. Was God expecting that from his creature made of

mud? Did God now say, “Behold he has eaten of the tree of knowledge and he has become like one of us.”

He had a good feeling about the young man, but no one would have predicted what he had managed to accomplish. Every good tradesman dreams that he will take his son into the trade and his son will outshine him.

He had been sitting at his desk with his head in his hands as if he were staring at a chess game. Fastidious Chadwick in his corduroy jacket and silk tie stood at the kettle making his fastidious tea. His mind was a million miles away or rather his mind was in the basement laboratory which he walked away from at his own peril. A new experiment was in the works and a mistake in the specifications could ruin the results in ways that might take weeks to find. Carefully Bohr drew a formula on the chalkboard in Rutherford’s office.

$$W_{r_2} - W_{r_1} = h\nu$$
$$\nu = \frac{2\pi^2me^4}{h^3} \cdot \left(\frac{1}{\tau_2^2} - \frac{1}{\tau_1^2} \right)$$

“What is this, Bohr? Is this Hebrew? I am not of that tribe.”

“No, Chadwick, this is a quantum calculation.”

“It is nearly as obscure as Hebrew. Please expound, Rabbi.” Chadwick had discovered that Bohr’s mother was Jewish, that Bohr was in fact a Viking Jew.

Bohr continued. “When a hydrogen atom gives off light, the energy comes from the hydrogen atom’s electron. It gives off light at specific wavelengths. That is how we know it’s a hydrogen atom.” His grammar was much improved, thank you very much, but he could see that the nasal lilt of his Danish melody made them concentrate in order to understand him. There was often a long second when he finished speaking while they assembled his words into the King’s English and made sure they got what he was saying

“Yes all right, said Rutherford. “Never mind the schoolboy stuff. We are all grown men here.”

“I use Einstein’s quantum theory of light, and so I can calculate the wavelength of the light emitted by a hydrogen atom.”

“Can you indeed,” said Chadwick with charm and sarcasm in equal measure. “I should very much like to see you try because that is rather the Holy Grail of the whole enterprise these days and anyone who can manage it would go to the head of the class, wouldn’t he, sir?” Rutherford kept silent. He was concentrating on Bohr’s eyes which held a hint of a mad intensity at the moment. Are we going to have to talk him down from some intellectual ledge and nurse his Danish disappointment for days on end? He sincerely hoped not. On the other hand, he could not imagine how Bohr could prove his outlandish claim.

“e,” said Bohr, “is the energy of the atom. m is the mass. We know those values from your brilliant experiments.”

“Yes all right, no need to flatter me.” But Chadwick was in fact flattered.

“ e is $4.7 * 10^{15}$. m is...”

“Yes we know the value of m ,” said Rutherford. He now suspected that something brilliant might be coming. Or possibly something mad that was impervious to reason.

“ h is $6.5 * 10^{-27}$ That’s Planck’s constant.”

As he watched the calculation proceed, Rutherford tucked his chin into his chest as if he were expecting a blow.

“The result is $3.1 * 10^{15}$,” said Bohr.

Chadwick, who wasn’t really looking, jerked his head around. Rutherford dropped his teacup on the desk.

“You’re bloody well lying!” said Chadwick as his excitement rose.

“No, I promise you I am not.”

“But that is precisely the wavelength I get with my spectrograph. That is the wavelength of light produced by a hydrogen atom.”

“Yes exactly. My calculation predicts within a hairsbreadth the answer you get in the lab.”

Chadwick was jumping up and down and giggling. “No, it cannot be.”

“It can be,” said Bohr, a smile slowly spreading across his face,” and it is.”

“Show me that again.” Niels repeated his calculation.

“It cannot be!!!!” Chadwick bounded about the room like a massive overgrown puppy. He slammed a hand down on Rutherford’s desk. He kicked over a chair. He got down on his haunches, grabbed the back of his head and howled.

Rutherford stood up walked over to the blackboard with his hands over his mouth. “You’ve damn well sussed it, haven’t you?” he said rather quietly.

“I believe I have, sir.”

“I believe I have, sir.” Chadwick, nearly incredulous, mimicked him.

“Gentlemen, let’s be careful. Let’s be cautious,” Rutherford growled.

“No!!! Why????” Chadwick fairly shouted.

“Because I prefer caution to reckless theorizing. I want to take this step by step. Chadwick!”

“Sir?”

“You do not breathe a word of this until I say so.”

Chadwick walked up to Bohr and stared at him. “You bloody beautiful man! Are you seriously telling me you have found the reason behind the spectrum of hydrogen?”

Bohr laughed and rocked a bit in his chair. “Yes, as far as I can make it out at this point, the electron moves from one orbit to another and in the process gives off a photon of light at a wavelength that is precisely determined by the size of the move.”

“When did you do this?” Chadwick’s face was flush with excitement. Rutherford made a great effort to conceal his admiration.

“I did the calculation last, night, Chadwick. I haven’t slept a wink.”

“No I should think not.” He laughed so hard he nearly choked.

“I have been up all night walking and thinking out loud from one end of Cambridge to the other. At one point I sat down beneath a tree and tears came to my eyes.”

“You are the bloody Buddha of atomic physics, aren’t you?”

“He is nothing of the sort,” said Rutherford.

“But look what he has done, Ernest, old boy! He has been cooking up his fantastic theory like a little sorcerer’s apprentice at his cauldron, eye of newt and toe of frog, wool of bat and tongue of dog, muttering and tinkering and tasting and stirring. Telling no one, although I must say there was a very suspicious smell about him these last weeks. I didn’t take him seriously for one moment. And now look what he has done!! He has found a quantum physical explanation for the wavelength of light emitted by a hydrogen atom.”

Rutherford smiled and chuckled a bit. Bohr began to giggle like Chadwick.

“If it is so....” said Rutherford.

“If???” shouted Chadwick.

“IF! Yes if. If it is so, it will take a lot more work than a drawing on a blackboard.”

“Forgive me sir,” said Bohr. “I work on this since the day we are met in your office. I do nothing else. “

“I suppose you think this disproves my picture of the atom.”

“No sir, it *improves* it. I replace classical physics with quantum physics.”

“He’s right, Rutherford. This will look well on you,” said Chadwick. “This will dress you up in Saville Row when you go to meet the King.”

“There’s more,” said Bohr as he picked up the chalk on the blackboard sill.

“There’s more!“ said Chadwick to Rutherford with a wink at Bohr.

“If you put $(\tau)_2 = 2$ in the formula, you get the Balmer series. If you put $(\tau)_2 = 3$ in the formula you get the *infra-red* spectrum of the hydrogen atom. And... I predict that if you put $(\tau)_2 = 4,5$ etc. you will get a set of values in the *ultraviolet* range that has never been looked for but should be rather easy to find.

“Bohr, I’m going to kiss you,” said Chadwick. “I am going to bloody well kiss you, you melancholy Dane!”

“Well well,” said Rutherford. “Chadwick here seems to think this is a significant piece of theoretical research and it’s all over bar the shouting.”

“You know perfectly well it is,” said Chadwick. “He may not know an anode from a cathode...”

“He doesn’t!” said Rutherford.”

“He may not know a glassblower from a brass fitter...”

“He doesn’t!” said Rutherford again.

“And he may not know a hawk from a handsaw, but he knows which way the wind blows in the realm of atomic physics!”

“Thank you, Chadwick. And I do get the reference. It is Macbeth, is it not?”

At which Rutherford and Chadwick exploded in laughter.

I loved Bohr. Only half Jewish, but he was all Viking. Like the captain of a longboat he made landfall at his monastery of Lindisfarne and looted it of its unguarded treasure. Then with his battle-ax wits he bludgeoned the rest of physics into submission. The first treasures were easy pickings. Then it got more difficult. It required more men, more cunning, more cruelty, more death.

Chapter Three

A Secular Bar Mitzvah

At Harvard they all wondered what was it like to have a mind like his. The ones who knew him well enough to know what he could do, the ones who had seen him in action. Like the

week in which he had learned to read and speak basic Sanskrit. And the several months afterward in which he had memorized the *Mahabharata* and began threading it effortlessly into his conversation. They didn't say so aloud. They didn't like to admit it publicly that Robert Oppenheimer was so uncanny and they were so merely human. He didn't seem to be capable of forgetting things. He remembered everything he ever read, everything he ever picked up in a seminar or a lecture hall or in conversation.

His hair steamed off his head like water vapor rising off a New England pond at sunrise, cool and alluring, drifting away and gathering again as you watched it. His dark complexion looked like a rich man's tan but was in fact the schoolboy pallor of his desert Mediterranean skin. His quiet eyes focused beyond your face at the interior of your head where he imagined the only real part of you resided. He wasn't quite charismatic, not yet, but he was arresting, confounding, curious.

The thing was he had only begun to accumulate a dense interpenetrated network of thought, image, idea, hypothesis, theory, explanation, commentary and criticism. He knew it would grow ever deeper, denser and layered as he worked his way through Harvard and after he left Harvard behind. He knew it meant something. He had been chosen. He liked the irony of the idea but more importantly he felt the truth of it in his being. It seemed to charge the world around him as he moved through it, sometimes impeding him, sometimes propelling him forward.

In their digs off Harvard Square, he and Freddie were taking a break from a late night of studying. He lounged in a soft leather chair his mother had shipped to him from Riverside Drive. Freddie lay on the corduroy couch he had retrieved from the street at the start of the semester.

“Tell me, old man, because I have often wondered, do you believe in God? I mean even a tiny little bit?” Freddie loved to provoke Robert with a seemingly innocent question out of the blue.

“Don’t be a bore, Freddie.”

“What? I’m only asking.”

“I believe in the second law of thermodynamics and the special theory of relativity,” said Robert rising to the bait.

“But that’s not belief, that’s knowledge. What I want to know is what do you *believe in*, if anything, in your scientific world of inference and deduction and logical tautology.”

“No, you don’t understand me. I *believe* in science. Its value, its worth. I’m not talking about what I know of science. I’m talking about what I believe in. I put my faith in Science, my allegiance, my soul.”

“You don’t have a soul. You just said as much.”

“I most certainly do have a soul. It might be the only thing I truly do have.” He got up and went to his bookshelf where the Bhagavad Gita and the Mahabharata waited to be called up to the front.

“But the human soul comes from God, it’s a spark of the divine.”

“You’ve got that from the New Testament. That’s a very dangerous book to be reading.”

“Are you saying you’ve read it, Robert? The Christian Bible?”

“Yes and the Hebrew Bible.”

“Have you really?” Freddie did not appear to be truly surprised. He was probably posing for effect.

“You have to read it. Without the Hebrew bible you are illiterate. I’ve read it. I reject it.”

“Oh you reject it, do you? The Old Testament, the New Testament and the horse they rode in on?” Freddie raised an artful eyebrow and went to put the kettle on. He seemed to be thoroughly enjoying himself.

“Do I sound like an ass?” He knew he sounded like an ass. Not that he particularly cared. He was very good at sounding like an ass. It was a skill he cultivated.

“Not at all, my good man. You sound like a Harvard man. “What about this fellow, Siegfried? Where do you stand on Siegfried?”

“Do you mean Freud or Sassoon?”

“Freud, your man Siegfried Freud.”

“He’s not my man, Freddie.”

“Your people I mean, your tribe.”

“My tribe is science. My covenant is with science. Science will save us, Freddie, not Jesus.”

“All right, all right. I’m only asking. There is no need to get personal about it.” He had got to Freddie with the mention of Jesus’s name as if he had crossed a boundary. Freddie couldn’t quite shrug it off.

“What do you believe in, Freddie?”

He must have been waiting to be asked. He did not hesitate. “Truth is beauty and beauty truth. That is all we know or need to know.”

“Do you know it or believe it?”

“The poet is being playful. How can I know it or prove it? I can’t. I can only believe it. And I do.”

Silence. Caesura. They regrouped.

“And what of your love affair with the Dark Lady of Spinoza?” Freddie was stepping onto thin ice. He must have been bored and didn’t want to get back to work. The Dark Lady was apparently a grad student in the Philosophy Department who spent her evenings in the library reading Spinoza and writing something that seemed to be a dissertation, or something Robert hoped was her dissertation. That at least was his working hypothesis. He had chanced upon her at the start of the semester and he was smitten. He began to observe her unnoticed. After all, Spinoza, apostate Jew of Amsterdam, master craftsman of the telescope lens, who died of lung disease brought on by the prolonged inhalation of glass fibers in his work, who still

found time to strike one of the first major blows of the Enlightenment, that would have to be Robert's kind of woman.

"I'd rather not talk about that."

"Have you breached the silence that surrounds her at her desk in the library?"

"No, Freddie, I have not."

"Have you slipped her a note in Latin professing your desire to know her intimately?"

"I have done no such thing."

"Have you followed her home? Discovered her name? Stolen a glance at her dissertation? Suggested improvements?"

"Freddie, please." He got up, went into his room, got into his bed, pulled the covers over his head and did not come out. Before he turned in at 2 am Freddie went to the door.

"Did I say something wrong? Have I offended you?"

There was no reply from Robert.

"Are you asleep? Are you alive?"

"I wish I were dead."

That was a common trope in his college life. Not, "I am going to kill myself," but "I wish I were dead." Occasionally it was "I don't want to live any longer." Freddie had heard it many times over. The next morning he did not appear at 9 am to make himself a breakfast of jam and honey on toast, nor did he make his peanut butter and chocolate syrup on toast. I wish I

were dead did not contain a call to action. It was a state of mind not a threat. That was how he intended Freddie understood it. When Freddie got home from class that afternoon, he was sitting in his leather chair with a book on his lap.

“There you are,” said Freddie with some relief. He scarcely heard him. The scowl on his face, the sneer on his lips, his staring inward-looking eyes were all that was left of him. That was the extent of his consciousness. Each time words began to rise, they quickly subsided before they broke the silence in his mind. Each time the urge to move gathered in his body, it drained away and left him sunk deep in his stillness.

“Robert?”

He moved his eyes in the direction of Freddie’s voice but he did not raise them to Freddie’s face. He saw only the black shoes on his feet. Freddie could see the effort it took and he decided to leave Robert alone.

“Ok. I understand.”

But he understood nothing. How could he possibly understand? He was a mere human, a scurrying thoughtless creature who lived for cigarettes, beer and idle conversation. He closed his eyes in disgust and quieted his mind. Freddie did not guess he had been sitting like that all day, that a feeling of stony impermeability had taken him over, that his breathing had become the respiration of the sensible world, the living unmoving uncaring unseen unheard world that was all of being. “Being. My being. Human being. All being. The universe. Reality. The world.” The words rose and fell back into silence. He roused himself a bit from his existential stupor.

The words came again. “Being. My being. Human being. All being. The universe. Reality. The world.” Something prompted him to whisper them aloud.

“What?” said Freddie. Are you making contact with the external world?” He glanced again at Freddie’s shoes. And then another phrase, a kind of mantra that had spoken itself in his mind many times before.

“The incoherence of the incoherence.” Oh God he thought not again. I cannot stand this. I have to get out of this head. I have to silence this infernal mind. So he spoke. “She is unbearably beautiful. I don’t think I can stand it much longer.”

“I really think I ought to see this woman for myself. Why don’t you take me around with you to the library and point her out?”

“No! You may not gaze upon her.”

“Why not?!?”

“She is a thing of my imagination. I do not care to have her rendered into the objective world.”

“You are being ridiculous, Robert.”

He leapt out of his chair and flew out of the room, out of the apartment, out the front door into the street and ran headlong down Mt. Auburn Street to the bridge over the Charles River. Freddie chased him but could not catch him.

“Robert, he shouted, where the hell are you going? You’re not even dressed!”

He ran on with his dressing gown streaming in the breeze, reached the bridge and climbed up on the railing. Freddie caught up to him panting and grunting, grabbed him by the shoulders and felt him slip out of his dressing gown and fall away into the ice-cold river. He shouted with the shock of contact with the water and disappeared beneath the bridge. Freddie cursed the best that he could and flung himself into the river on the other side of the bridge where Robert was flowing into view. He realized immediately he had chosen a particularly demanding and inefficient way to die, if that in fact was what he had chosen, one in which his body would not simply go along for the ride his head was navigating, would in fact seek to leap from the car the first chance it got, was in fact seeking to leap at that very moment when the invigorating painful cold of the Charles had overwhelmed all thoughts of doing himself in and converted them into the single word, "Help!" If it were merely a way to make a point, he had made it quite strenuously well and now he wished to conclude the exercise while his wits were still about him and not permanently detached from his corporeal existence. The two of them, shouting and cursing and laughing and crying, made their way to the stone embankment where they grabbed ahold of the soft wet vines that grew over the pavement and pulled themselves up and out of the water.

"You confounded idiot!" Freddie shouted.

"I know! I know! I'm a hopeless fool!"

"Yes, you are!"

"Yes I am!"

As the manic urgency of the situation began to fade they shivered and shook. He stood on the embankment his eyes wide with wonder at the frigid grip of the air on his body. He shouted. He roared. “I am out of my mind!!!”

“I know you are!” Freddie shouted with the same shock of the cold settling in his skin.

“You don’t have to keep reminding me!” Breathing so deeply he thought he might burst, he panted with an animal urgency. “Why did I do that?” he shouted with confused glee. He was more awake now than he had been for years, more awake than the sailor on the Sound in his twenty-eight footer running for shore with a squall coming up behind. The colors of drab stately Harvard grew bright. The red brick of the dormitories throbbed. The blue of the sky shimmered.

“Are you happy now? You nearly drowned the both of us.”

“Much happier. If you really want to know. We must try this more often when we have the blues. It really does the trick! I feel like a new man.”

They stared into each other’s face, looking for something, they didn’t know what, but something that might explain what had just happened, looking for a recognition on the other one’s face that they had had an adventure but now it was over and they were going to be all right. When they were satisfied they had seen what they needed to see they turned towards home and walked quickly, stiffly and then more quickly breaking into a trot and then a run as the sharp wind stung their skin until they collapsed on Freddie’s sofa, stripped off their wet clothes, bundled themselves up in blankets and slowly warmed up and fell into a deep sleep.

When he graduated from Harvard in '25, he made his way to Cambridge, to Ernest Rutherford's Cavendish Laboratory because it was the center of the known universe of science. Where else could he go? He had to be at the center of this new assault on nature. He had read all of Rutherford's accounts of his experiments splitting atoms, isolating the proton, transmuting elements like an alchemist of old, peering into the vast spaces of the atom to divine its structure. He read Bohr's revolutionary papers about the quantum nature of the atom. He wanted to immerse himself in that world.

Rutherford sat him down in his cluttered dark office and evaluated the awkward tall American with the glowing recommendation from Harvard. "Get yourself down to the laboratory and learn something useful. We need beryllium. We need fine strips of it for bombarding with alpha particles. Start there. Learn how it's done on the laboratory floor, how to tinker and fuss, how to design and construct, how to think in experimental terms and not this head in the clouds fairy dust mathematical nonsense. Learn how to use your hands, your ingenuity. Learn patience and painstaking precision. There's a good lad."

The lab of which Rutherford so reverently spoke was a dark humid basement, a forest of electrical wiring growing like impenetrable vines on the dank cement walls of a jungle overrun with caterwauling monkeys. Young men in baggy tweeds with burns and stains stood by radiators that hissed away. Tabletops crowded with vacuum tube assemblies, jerry-rigged batteries and heated vats of unnamed compounds looked like abandoned cities of the jungle overseen by disinterested gods who prodded and poked their intricate architecture to see what had become of the civilizations that once inhabited them.

And he found he was impossibly bad at it. Like some Dickensian clerk wasting away with starvation and cold as he counted out coins for the rich man who employed him, he stood over a table and coated delicate film with the thin layers of beryllium the apparatus required. Machines broke when he came near them. Calibrations went haywire when he breathed on them. Batches of beryllium threw themselves off the table in panic at the mere sight of him. A lethargy, a torpor came over him.

The quiet burning intensity of the young men in the lab wearing almost identical garb, hunched over worn tables in twos or threes, erupting into arguing over the results of experiments, data, traces of chemicals, assays, titrations, it all reminded him of the fervent young men in prayer shawls and fringed vests who crowded around the tables in the yeshivas of the Upper West Side studying the words of the Torah and the Talmud for signs of inspiration from God.

He went back to Rutherford and tried to explain. He sensed that he sounded like an overprivileged rich boy from America although he couldn't put it into words. "I am not very good in the lab. I seem to be hopeless. I am doing more harm than good. Perhaps I should go home and rethink." He wallowed. He indulged. He excused. He wanted to murder himself right there in the room. Rutherford had seen it before. He was a bit offended by the open depth of feeling the young man expressed. "Buck up," wouldn't do. "Carry on," would be of no use. None of that Rudyard Kipling nonsense seemed to be appropriate here. And so he did a remarkable thing.

"Now listen here, young Oppenheimer. I am going to give you the benefit of the doubt. This laboratory is not an off-the-rack, one-size-fits-all operation. You are a round peg. Let's

stop pounding you into the square hole.” Rutherford was rather pleased with the way that came out. Eloquent, almost. “What am I going to do with you? That is the question.”

“What do you suggest I do, sir?”

“I understand you are very good with maths.”

“Well, yes I suppose I am. I have been hearing about all this new quantum science.”

“Have you indeed?”

“Yes sir. It’s quite new, isn’t it? I never heard the words quantum physics spoken aloud till I got here sir. It doesn’t seem to have reached America yet. But it interests me.

“Look here.” He cleared his throat and assembled his thoughts. “Now that Bohr has collected his little trophy and trotted off the Copenhagen to open his new enterprise, I need a good theory man around here. Maybe you can be of some use on the theoretical side.” He had no idea that Rutherford was merely shunting this boxcar onto a siding, hoping he might get lost in the trainyard and rust away quietly. “Go about this business anyway you please. Tramp through the heath. Drink in a pub. Sit in your room and scribble. Talk to the magpies. I don’t know how you fellows do it. Just go do it. Read up. Ask around. Find some like-minded monks and get to work!”

Thank you, sir”

“You’re bloody well welcome. Now is there anything else I can do for you?” He did not know this was Rutherford’s way of ending an unpleasant conversation.

“I’d like a chalkboard,” Oppenheimer replied. “I do my best work at the chalkboard.”

“Take one. They are everywhere. They proliferate. They appear to be the offspring of my graduate students. Adopt one. Do your worst. Bring me brilliant papers. Get yourself a Nobel Prize for Physics and then you may go off and found your own laboratory in the wilds of the American wilderness, like bloody Niels Bohr and his Institute for Theoretical Physics, confound his traitorous Danish soul.”

Oppenheimer stood at the blackboard in an isolated room on the top floor of the laboratory and perfected the art of chain-smoking cigarettes. Occasionally he looked out the window at the landscape of chimneys and steeples and sighed. He covered the surface of the board with the tortured Greek alphabet of pis, rhos, thetas, sigmas and gamma gamma gammas of Bohr’s quantum theories but also the new matrix mechanics of Heisenberg in Göttingen with its lockstep armies of irrational numbers lining up in military formation between long brackets. He looked for errors, for weaknesses, for entry points, for any place where he might go on, branch off, explore the formulae that Bohr and Heisenberg had bequeathed him. But he could not find a point, a path, a mountain in the distance or even a river running away into the English countryside that looked inviting, intriguing or even a little bit curious. He covered the floorboards with cigarette ash. He imagined a white streak was forming where the smoke curled up between the two thick streaks of his eyebrows singeing the hair on his high forehead. He stood all day scrawling, erasing, scrawling, erasing, looking for a glimmer of intuition but nothing came. The cigarette ashes darkened the floorboard beneath his feet. He ran his palm over his face so fiercely and frequently he imagined he was erasing it along with the equations on his blackboard. He alternated between rage, despair and anxiety. Had he overestimated his capabilities? Was the big fish from the small pond lost in the depths of the ocean? He berated

himself mercilessly. You idiot! Look at yourself. You're wasting your chance. They're all whispering when you pass. You can't meet their gaze. You slink. You shuffle. Where have all your ideas gone? You are unmanned and useless like Samson without his Nazarene locks. He ground the chalk with his fist till it crumbled to the floor, fell beneath his feet and mixed with the ash from his cigarettes. He sat akimbo in the dilapidated rump sprung armchair and muttered. He slept. He woke. He drowsed somewhere in between. Sometimes he got up to eat. He developed grudges on his advisor, on the grad students in the Lab, on Cambridge, on the world. He felt he might go mad.

There was only one thing left to do before he admitted failure. He engaged a psychiatrist in London who listened to his bizarre tale of the mathematical secrets he was fighting to unlock, the statistical nature of reality, the effects of gravity on time and space, the antagonisms and slights of his so-called comrades, the insidious provocations of Mr. Rutherford whom he worshipped like a father, who eviscerated him like a wayward son, his angers, his fantasies, his sense that he could pierce the veil of nature with his warlike soul, descend into the underworld, sing his gorgeous song of science and return with the beautiful damsel of truth.

"You must stop coming here," said the psychiatrist at last. "This is very dangerous for you to elaborate these far-flung fantasies. You are suffering from Dementia Praecox." On the corners of the desk, a small bleached skull and a rough shard of an Egyptian ruin engraved with faint hieroglyphs stood guard over his academic reputation.

Oppenheimer was dumbfounded.

"It is Latin for precocious madness."

“I know what it means, dear sir,” and he proceeded to elaborate the etymology of the words beyond the Latin to the Sanskrit.

“Despite your illusion of deep learning or perhaps on account of it, you have developed a form of psychosis characterized by the disintegration of the cognitive faculties in the late teens or early twenties, affecting memory, attention and the ability to complete complex tasks. It is rapid and unresponsive to known treatment. It has been shown by Kreapalin to be a progressively deteriorating disease from which no one recovers. I cannot treat you. I cannot help you. You were best to sail for America while you still can and find a safe and quiet place to live out your remaining days. Luckily you have financial resources. You need not be placed in an institution for the incurably insane. But you must make haste. Goodbye. I’m very sorry to have to tell you this. Good day.”

He stood up unceremoniously. Oppenheimer stood up and walked out. Somehow he got himself to Victoria Station and placed himself in a closed compartment. Was it in fact precocious madness and not precocious genius? He watched the brick and mortar cityscape give way to the timber and wattle countryside. He brooded beyond words, as he had so often growing up, in a darkness where deep sadness overwhelmed him and settled in his temples, behind his forehead, in the back of his neck where his spine inserted itself into his skull, in his heart, in the pit of his stomach. As the train traversed hedgerows and country roads cut deep into the farmland he could feel his brooding deepen and darken. He went to bed and slept for days on end. He got up and sat like a mummy in a sarcophagus of depression, still as stone, quiet and silent as the undeciphered hieroglyphics on the Egyptian tomb that preserved his melancholy for eternity.

Slowly, he began to eat again. He began to walk again. He felt his faculties emerging from the darkness as light returned to his inner world. He knew beyond judgment or evidence the psychiatrist was an idiot. All of Great Britain were idiots, doctors, physicists, grad students and their insufferable, noisy girlfriends, all spectacular idiots and fools. He delved more deeply into the newest papers. These two German fellows Heisenberg and Schrödinger were lobbing bombs of seeming genius back and forth concerning the proper interpretation of the enormous amount of experimental data that was pouring forth from the Cavendish Lab, from the Manchester Lab, from Otto Hahn's lab at Göttingen and the Kaiser Wilhelm Institute in Munich. It was a great time to be alive, to be thinking about quantum physics: Schrödinger's Equation, Heisenberg's Matrix Mechanics. He was excited by an intuition they were two sides of the same theoretical coin. This was an idea he wanted to explore. He would leave this land. He would find a better place to continue his quest. In Göttingen with the hard-headed scientifically advanced Otto Hahn, if he would have him.

But first he would exact his revenge. They had shamed him. They had thwarted him. He was not a lab troll. He was a mathematical theorist. He needed to think not tinker. He needed equations to solve, not beryllium film to prepare. He concocted a program to sabotage the exacting work on beryllium film the lab required, that he was incapable of fashioning himself in spite of the patient training they gave him and for which they shamed him mercilessly. He would adulterate the film in such a subtle, undetectable way it would queer the results of the entire lab, set them back a year and ruin the reputation of the Cavendish. He would haunt their dreams and confound their tongues. But it was not enough. He devised a plan to poison his

advisor. The idea filled him with dark malevolent glee. He imagined it. He pictured it. He planned it in rigorous detail. He imagined it done. He imagined his own smug satisfaction.

But when he had made all these plans and envisioned them in exacting detail, somehow in the deepest reaches of his mind, he knew there was something else entirely that had to be done. And so he finally turned his mind to his own progress as a scientist, as a human being, as a tortured soul. He commenced to analyze himself, never mind the idiot in London with his posh accent and cold manners. He could read for himself. Psychiatry was not quantum physics, not by a long shot. He saw quickly what he would have to do. He had at the center of his emotional life an adolescent disregard for the lives of others. He could see that now. He would have to break himself of that. He would have to stop blaming the world for his troubles. He would have to grow up and resist the adolescent urge to poison and corrupt the people who cared for him. He had disappointed them. He had disappointed himself. But now we must emerge from this cocoon of adolescent depression and get on with his life.

Freddie was in Cambridge (thank god for Freddie) getting his doctorate in Medicine. “Corsica,” said Freddie, sitting gingerly in an armchair in Robert’s miserable digs. “My god, Robert. Open a window. Throw back the curtains. Wash a cup. When was the last time you rinsed out this kettle?”

“Corsica? What about Corsica?”

“Wyman and Edsall and I are going off to Corsica.”

“And who are Wyman and Edsall?”

“Good chaps. You’ll like them. Come with us. A fortnight in Corsica. Good food. Good air. God company.”

Only fragments of phrases came to him like in that novel by Joyce. “This is how.” “I am so.” “Where have I.” The inner monologue of his character.

The town seemed to rise out of the sea. No, the town seemed to have come down to the sea for some bracing salt air and now it was having second thoughts, poised at the edge of the abrupt cliffs. Red tile roofs, aging walls of peeling whitewash, soft yellow, coral and aquamarine, bright blue doors, unglazed windows behind faded blue shutters, in the harbor, sailboats in their slips, their masts in the air like radio antennas receiving coded signals on private channels for the privileged use of their wealthy owners. The statue of Bonaparte in the town square looked suspiciously like Michelangelo’s David. In the open-air market, he found red slabs of salted mullet roe, jars of anchovies with oil, garlic and parsley, thick-armed women slicing ham for passersby. In the rugged lush mountains teeming with goats and their silent goatherds, he ate lunches of stewed kid with steamed fig, knuckles of lamb and roasted tomatoes served on round stone tables, figatelli sausage from Corsican black pigs smoked over chestnut wood. The noonday sun struck his head like a mallet on a copper gong. The late afternoon sun sliced into his eyes like bright knives. The setting sun was the resolution of a symphonic movement in a minor key, pensive and peaceful. The twilight sky contained all the blues he’d ever seen. The moon. The stars. By the time he saw her in the marketplace in Bastia, his senses had been so bewitched he wasn’t sure that she was real. When he saw her again, she was

standing at the corner of the street with her face tilted up to bathe in the warm breeze. There was something about the way she held the basket, something about the way she stood with her feet so close together, something about the head of hair beneath the white kerchief threatening to come undone, something about the look on her face, a pleasure so sharp it made her wince. And something about the fact that Freddie, Edsall and Wyman didn't seem to see her at all. So he kept her for himself and waited to see her again.

He didn't talk to women. He didn't approach them, chat them up, make them, move on them or any of that inexplicable courting behavior. But when he saw her in the marina with its fine sailboats he heard himself speak and as he spoke he heard himself wonder how is this so easy.

"Does one of these belong to you?"

She smiled and said, "Does one of these belong to you?" Perhaps a bit incredulous that one so young might be the master of one of these.

"No," he replied, "I come down here to admire them, the craftsmanship. I'd like to own one someday."

"American?" she asked. "Or British?"

"American, I confess."

"Normally I can tell."

"Probably because I've been living in Cambridge, that's a college town in England. But I'm from New York." He hoped that might impress her.

“And do you like it here in Corsica?”

“I’m wild about it.”

They slipped back and forth between his halting French and her stumbling English.

“*Ah, oui?* The bee's knees, is that the phrase?”

“*Bien sur.* The bee's knees. The cat’s meow. Yer aunts pants. Sorry, *ça, c’est un petit* off color.”

“Off color?”

“Impolite. *Pardonnez-moi.*”

They stood on the precipice of the moment. At some point, he wasn’t sure how it had arrived, he reached for her hand. A stern flash of her eyes and a brief shake of her kerchiefed head. He mentioned to God that he would like for her to loosen that kerchief and shake her hair loose for him someday.

“Oh but you are so forward, you American boys. This is not attractive at all. *Pas de tout.*”

Yes I know. But I have an excuse.”

“*Comment?*”

“I have seen you several times and each time I am *comment dit-on, bouleversé?*”

She laughed an extraordinary laugh like the birds at sunrise if you happen to be awake.

“Boulevard, ça veut dire upset.

“I am! I am upset. You upset me. You startle me.

“Vous voulez dire submerger.

“Vous me submergez complètement.”

“So strange, you are. So young and so handsome and yet so strange.”

The breeze under the curtains. The voices of children. “How do I?” “What do I?”
“This is.” “She is Molly.” “I am Stephen.” “Bloom.” “Dedalus.” His eyes were closed. He
opened them. She was gazing at him. He met her gaze and reached for her hand beneath the
white quilt with blue lilies stitched into it.

“Oh la la, what have I done? I am in shock.” But she didn’t say shock. She said *“etat de choc,”* and kissed him.

He did not care to think about what had happened. He had no need to rehearse or re-enact
it in his mind. It was already in his body, in his whole being. It? She. She was. Her name was
Emma. He was Robert. Roe Bear. With that musical “R” that tickled and caressed your hearing.

“Encore une fois?” One of them had said it. It didn’t matter which.

“Where have you been?” Freddie asked the next morning when he turned up ruffled and
bleary-eyed at the pension. It would never occur to them where he had been. It would never
occur to him to tell them.

“Qu’est-ce que ça veut-dire?” He asked himself. “What does this mean?” He did not know.

Emma took him into the mountains, up the winding switchback footpaths that ran along the spine of the island and showed him the sea in the distance. They stopped along the way in a small mountain town of rectangular blocks of granite and sun-bleached plaster set into the hillside by a mason from a race of giants, or like facets of a rough cut jewel. Where were these thoughts coming from, he wondered?

“All this reminds me of the desert in New Mexico.”

“It sounds very exotic to me,” she said. “Is it newer than the old Mexico?”

“You may laugh, but when the moon is low over the desert you feel like the world has just been born.”

He told her about his life in Cambridge, his work and his frustrations. She told him about her life in Corsica, her family, how they made a living, how the women cooked and the men ate, how the women worked and the men drank coffee in the cafes, how they always seemed to be happier than the visitors to the island who rushed around and missed everything. He said this place is beautiful but he could never live here and give up physics. She said if you lived here you wouldn’t need physics. He wondered if that could possibly be true. Could he ever be content to live with the day-to-day happiness he saw here and renounce the lifelong ambition that had driven him so hard he’d had to take refuge here, if only for the fortnight? They lay on a hot blanket in the spiky mountain grass, his head burrowed into her neck. He had no memory in his

hands of bare skin like this bare skin of hers, the feel of it, the way it held his palms in place like magnets. He marveled humbly.

Her bed above the street rocked in the moonlight. A cotton sheet worn thin with washing on the rocks, stiffened on the balcony in the heat of the day, cooled in the evening air and saturated with the scent of their efforts settled over them till morning.

“Why are you so handsome?” she asked him as he was dressing.

“Because you are so beautiful,” he replied.

As he meandered home he asked himself was he in love with this woman? Was that possible? Was that how it works? A small boy sat in a window with his feet dangling out, his mother behind him. She spoke to him gently and ran her hand through his hair. He stopped to watch them. Seagulls came down out of the sky, wheeling around a small bubbly fountain, and dropped in for a landing. A goat peeked out from an alleyway. An old man swatted his donkey as it dipped its head to examine the cobblestone. Had this never happened before? How could it be he had never appreciated the life assembled all around him? He hunkered down in a stoop and leaned against the door loose on its hinges, hugging his long lanky legs with his arms. The way he had hugged her at the foot of the bed kneeling almost in prayer. He looked into the sky. Not a cloud anywhere. Not a blemish on the world, he thought and also how unlikely were these words coming from him. He wished never to get up ever again, but he did. He rose into the summer air and thought, have I grown? Do I not take up more space in the world? Do I, square peg, not fit the round hole?

I am in love with this woman.

“Where have you been, Robert old boy? Have you been sailing? Look at you. You appear to have been out all night under the stars navigating or some such thing. Wielding your sextant. Reaching into the wind. Have you been fishing with the local fishermen? What did you catch? Have you brought nothing home to share with your hungry companions?” Freddie was his usual wordy self.

Everywhere he went he recognized that something had changed in the world. She had changed it. They had changed it. Or it had changed them. He did not think of linear algebra or calculus. Instead of solving equations for unknowns, he knew. He was certain. Everything was apparent and immediate and right.

He was in love with this woman.

They said goodbye in a small restaurant. The proprietor eyed them enviously.

“Will you come back?”

“I will.”

“Will you still find me beautiful?”

“I will.”

“Will you always love me?”

“I will.”

“Will you remember me?”

“I will.”

“Are you telling me lies?”

“I don’t know how to lie.”

“I think you do. Everyone knows how to lie.”

“No, I have forgotten how.”

“*Ça c’est bon. J’aime ça.*”

“*Adieu.*”

“*Adieu, mon amour.*”

On the boat back to Marseilles he watched the island of Corsica fall over the edge of the horizon and sink into the sea.

He thought, I am in love with this woman.

But also, I am in love with the world.

The one he’d always hoped for. The other he never knew could be.

Back in Cambridge among the proletariats who toiled for the Ministry of Natural Philosophy he could see clearly what was to be done. There was more to this coming-of-age thing than women and love. There was the coming of age of the world. There was the coming of age of Physics which was bursting at the seams of theory and experiment, but not in Cambridge, on the Continent. In Copenhagen, yes, with Bohr, but also in Göttingen with Max Born and in Zurich with Wolfgang Pauli.

He didn't come to Europe unannounced. Two of his papers had been published by the Cambridge Philosophical Society. "Oh you're the fellow with the papers from Cambridge, aren't you?" someone in Max Born's class had remarked. "Yes I am. So you've read them?" "No but I've seen them lying about." In the next three years he did not blossom or bloom, he exploded. He drank in the pubs of quantum theory with like-minded drinkers. He ate in its cafes and beerhalls. He strolled down its treelined thoroughfares and smoked cigarettes in its manicured parks. He talked, he argued, he listened, he learned. He wrote sixteen papers on quantum physics. He was prolific, extraordinary, uncanny, unbounded, on fire. Starting with *On The Quantum Theory of Molecules*, continuing with the first paper published on the subject of electron tunneling and ending with he didn't remember what. Never mind. It was of no importance. He ran rampant all over Europe. He bested Paul Dirac on the nature of the hydrogen molecule. Dirac was his only match. They took long walks and investigated each other's minds. Dirac was very precise and sharp in his discussions of physics and mathematics. He looked eagerly into Robert's face for a sign of comprehension or approval when he had managed to clearly articulate a tricky thought. When he wove in a strand from some other cultural topic Dirac went silent and stared at the ground or into the sky until he had to jerk his head up and force himself to meet Robert's gaze, his arms thrust down at his side as if they were restraining themselves from grabbing Robert by the collar.

"Look, Robert, you can't be serious quoting me from the Bhagavad Gita? That is Indian boogah boogah. It has no place in the modern world." His head went back down again with the strain of the effort.

"And what about Shakespeare? What about Chekhov?" Oppenheimer replied.

“Why do you waste your time with literature? There is no truth in literature. There is only truth in science.”

“There is truth in literature, Paul!”

“No worthwhile truth. Seriously. How can I convince you to grow up and put away childish things? Every moment you spend reading Chekhov is a moment you are not doing physics.” The softness of Dirac’s voice had a charm that made him listen with respect as if he were helping an angry son to sort out his difficulties with life.

He took the measure of Werner Heisenberg and his uncertainty principle. Max Born loved him. He pampered and nurtured him. He made him his protégé. Pauli took him down a notch, but probably he deserved it. In Pauli’s raucous classroom, he spoke with urgency and great conviction. He did not suffer fools and they were all fools. He found his vocation and he found his voice. He wrote and he wrote. He knew what he wanted to say and he said it with mathematical precision and terse words. He did not argue or convince; he proclaimed.

He made one great friend in Zurich, a rather jovial little physicist from the Lower East Side of New York, as compact and outgoing as he was elongated and taciturn. There was no one whose company he enjoyed more than the company of Isador Rabi. They sat together for hours on end in Zurich cafés where students gathered to talk politics, to shout each other down with rising effrontery and outrage, to demonstrate their grandiloquence with raised fists, outstretched arms and jutting chins. They even jumped about and danced around to demonstrate their sense of aggrieved injustice.

Exasperated and puzzled by their outbursts, he asked Izzy one day, “Why are they so noisy about their conversation? It’s only politics from what I can make of it.”

“They are not discussing politics. They are attracting females.”

He recognized immediately that there were things Izzy learned on the Lower East Side of life that he had thoroughly missed on the 11th floor on Riverside Drive.

He carried a small notebook in his coat pocket which he took out from time to time. Sometimes he stared at it and a profound relaxation took over his face. Sometimes he merely took it out and held it in his hands. Occasionally he wrote something down or crossed something out.

“Where did you get that suit, Robert. It is utterly gorgeous.” Izzy could not resist asking.

“I got it on Savile Row. Have you ever been to Savile Row?” He knew perfectly well Izzy had never been to Savile Row. Izzy’s suit was of a baggy hirsute nature, shiny at the elbows with patient wear, protective, comfortably inexpensive and anonymous, a tortoiseshell of a suit, or rather an elephant skin.

“How much did you pay for it, if I may ask?”

“Oh I dare say I paid twenty pounds for it, rather inexpensive I should think, all things considered.” He had a habit of slipping into a British diction when anything English came up in conversation.

“My god man, I could buy ten suits for twenty pounds on Orchard Street!”

His suit was in fact magnificent, a Glasgow brown tweed with a rough streaked texture, rolled lapels on the vest and triple pleated pants that almost swallowed him whole in their extravagance. He reached reflexively into his coat pocket and took out the notebook only to put it back again.

“You’re working on something, aren’t you?” Izzy liked to prod him. He liked to be prodded.

“Oh I don’t know, maybe.

“Oh now come on. I have seen you take out that notebook twenty-five times today. It’s either a woman or it’s a paper you’re cooking up. And it’s not a woman. Is it the electron tunneling thing?”

He felt himself snap into place. “No,” he said. “No. It isn’t. It’s not electron tunneling at all.” He was gathering his thoughts.

“What is it then, if you would care to expound?”

“Izzy, I am done with the tiny, the infinitesimal, the atomic, the proton, electron shells, I mean I’m not done with them but look here.” He opened the notebook somewhere in the middle where he last made a note. “What about the big things, the really big things? What about the stars?” He stopped. As if that were all that needed to be said. As if the argument was self-evident and the rest mere commentary.

“What about the stars, Robert?”

“Everything about them.” What more did he have to say to make his meaning plain? Izzy did not appear to get it. “Look, what it is it we are really trying to do with all this quantum alchemy? Do we merely want to transmute lead into gold? No, we want to understand the solar system, the sun, the galaxy, the universe. All these tiny phenomena are fascinating and so mathematically elegant, but where does it all lead?”

“Does it matter where it leads?”

“I want to understand the stars. That is a worthwhile task. The galaxy. That’s so much more real than electrons and protons. The sun. How does it work? Why doesn’t it explode? Or implode? How on earth did it get there?”

“God put it there.”

“Well if he did, then he put it there so we could figure out how he did it.”

“Dirac says god is a brilliant mathematician.”

“Well so are you and so am I. And this is how we come to understand His handiwork.”

“You would compare yourself to God?” Izzy was only half kidding.

“He has left us a trail of breadcrumbs. I want to see where they lead.”

“Well of course you do. We all do.”

“But no one is doing this work. They’re all so busy splitting atoms that they can’t see the sun in the sky. Or if they do, they have no sense of wonder. I am on my own here. This is my secret project. I want to dazzle them. I want to blow the tops off their heads.”

“I think you probably will. And I’ll come along and tidy up your math, because really Robert, your attention to detail...”

“Yes I know. It’s not my strong point.”

Izzy burst into laughter.

“If you would read the Talmud, Oppie, you would be a better physicist.” Oppenheimer was pretty sure he was joking. “I’m not joking. I’m serious.”

“That is complete nonsense and you know it.”

“It is a way of looking at the world.”

“I prefer the Gita. Have you read it in the original Sanskrit? It’s magical.”

“This Hindu stance of yours is quite incomprehensible to me. You learn how to quiet the mind and leave the world. That will get you nowhere in physics. Now the Talmud is filled with questions and the subtle connections between things. Every rabbi in the commentaries has a different answer to every question.”

“What good is that?”

“You learn to think for yourself! There are no answers only points of view. There are the facts and then there is how you look at them. You learn to dispute. You learn to debate. You sharpen the cutting edge of your mind on the Talmud. You do not dull it. You do not extinguish it. Read the Tractate Sanhedrin. The Talmud is the midwife of physics. Really. It’s as difficult as quantum mechanics and it will keep you out of trouble.”

“I’m not in any trouble. I have found my vocation. The intersection of quantum physics and relativity is in the stars. Don’t tell ANYONE I said that. I am getting a head start on them all!”

“Fine fine fine. I won’t tell a soul. But one of these days when you are really and truly stuck, we will sit down and read the Tractate Sanhedrin. Just for the hell of it. You will be surprised, Oppie, genuinely surprised at the subtlety of the Talmud. It will free your mind.”

“And then, Izzy, we will go line by line through the Bhagavad Gita. It will bring you peace.”

“Possibly we are talking about the same thing,” said Izzy.

“Possibly we are.”

“But I don’t think so.”

Neither do I,” he said. But there was one thing he was sure of. He liked this guy Rabi from the Lower East Side.”

Offers poured in for him to teach and do research from all over America, including, and most intriguingly, from Birge and Hall who chaired the Science Department at the University of California at Berkeley.

Chapter Four

An Anti-Semitic Interlude

Birge and Hall took their lunch in the Faculty Dining Room. They had a private room with a waiter named Sam who was the son of a former slave. Sam was quite good. He almost seemed to disappear at times only to reappear out of thin air when they required him.

“Well what about this fellow Oppenheimer?” said Birge as he crossed his knife and fork on his plate to signal Sam he could remove it from the table.

“From Harvard.” said Hall looking up from his Beef Wellington.

“Yes the one from Harvard.”

“The Jewish one,” said Hall getting right to the heart of the matter.

“Yes I suppose he is.”

“Oh I’m quite sure of it.”

“I suppose I am too.”

“I mean the name. Oppenheimer.” Hall spoke it with a practiced German inflection.

“Well, the name could be Germanic.”

Was Birge hedging? “An Oppenheimer,” said Hall warming to the task, “is someone who lives in the region of Oppenheim in Germany,

“Somewhere in the East I think.”

Yes but here's the thing." Birge seemed not to be focusing. Or perhaps he didn't have Hall's misgivings. "A good stout German would not take his surname from the region. Only a Jew would do that. They had no surnames historically."

"They didn't need them."

"No they didn't. They had no real family structure. They had no history. They had no inheritance."

"No cultural inheritance."

Yes, that's it, Birge. He was starting to return the ball.

"Yes that's precisely what I mean," said Hall leaning in with a conspiratorial smile.

"They had nothing."

"Not even a last name."

They paused to digest this spontaneous bit of wisdom.

"So what about the man? It's a tricky thing." Hall continued his attack.

"They say he's very good."

"They do. They say he's very very good."

"These papers he's written. Have you read them?"

"Yes I have. Have you?"

"Yes I have. They seem to be very good."

“Very Jewish,” said Hall.

“Yes, I suppose they are. How do you mean?”

“Well you know the sort of thing I mean.” Hall resisted the explicit for the moment.

“Quantum physics?”

“Yes, quantum physics. It’s all the rage over there in Europe. Einstein. This other man Bohr.”

“Danish, isn’t he? “

Bohr. Oh yes. Danish. From what I gather.”

“Although they say he has a Jewish bloodline.”

Good, Birge, that’s what I’m looking for. “Oh well there you are.”

“But this is the very thing we have been talking about. How do we drag this department into the twentieth century? How do we compete with Harvard and Yale? I’m thinking out loud,” said Birge.

“And Princeton.”

“And Princeton, yes.”

“Look here’s the thing. He’s very good.”

“He is.”

“He would attract a lot of attention.”

“That’s true.

And hopefully he would attract a lot of grad students.”

“Well that’s the whole point, isn’t it?”

“And where would these grad students be coming from?” Hall was preparing his little trap.

“Well from Harvard and Yale I would think.”

“And Princeton.”

“And Princeton.”

“And what kind of graduate students do you see at Harvard and Yale.”

“Oh I see your point,” said Birge almost unwillingly.

“Do you?”

“*Jewish* graduate students. Is what you are saying.”

“That is precisely what I’m saying, Birge.”

“I don’t like these fellows.”

Hall relaxed. Birge was going to be all right.

“Neither do I,” said Hall. “Neither do I.”

“Their habits. Their tenor if I can use that word.”

“Their comportment.”

“Their cultural attitudes.”

“Arrogant. Sardonic. There is nothing worse than an arrogant Jew.”

“Talmudic!” said Hall, throwing down an ace.

“Oh that word. I could live a long while without that word,” said Birge who seemed to be getting comfortable with expressing the truth of the situation.

“Yes but here’s the thing. These men in the Ancient Languages Department, the ones who study Hebrew, the Torah, the Talmud.”

“These words are so fraught with the death of Our Lord,” said Brige who was clearly beginning to enjoy himself.

There was a momentary caesura while they considered the death of their Lord.

“Yes but these men who come from a strong Lutheran or Methodist background, *they* study these books and *they* are not tainted. They do not stink of it. Forgive me, that’s quite strong,” said Hall.

“We are speaking privately.”

“Yes we are being frank.”

“It’s essential.”

“My point is it’s not the book. It’s the race.”

“Yes.”

“Yes.”

“But we shall fall even further behind,” said Birge.

“So you think it might be worth the trouble?” Hall clarified in a most innocent tone.

“I really don’t see how we have any choice.”

Excellent. Birge and he both saw the danger but they could count on each other to make the case.

“They can’t all be Ernest Orlando Lawrence,” said Birge.”

“Now there’s a fine fellow.”

“A hale fellow well met.”

“That is precisely what he is.”

“He has a can-do attitude.”

“It’s more than an attitude. He says he can do and then he does!

“He does, doesn’t he.”

“He does indeed.”

They paused again to consider their options.

“If it doesn’t work out...” Hall took a different tack to make sure he had it right.

If it all goes south...”

“They’re going to blame us.”

“ ‘You’ve overrun us with Hebrews.’ ”

“ ‘You’ve tainted the place.’ ”

“ ‘Poisoned the well.’ Wouldn’t that be ironic?” said Birge.

“How would that be ironic?”

“It was the Jews who poisoned the wells of France. In the days of the Black Plague. Got them thrown right out of the country.”

“Not that there was any connection. Epidemiologically speaking,” Hall conceded.

“No, but it served them right!”

“Right. It’s important to remind ourselves of the consequences.”

“But it could be the salvation of this department. It could make us,” said Birge sitting up straight for emphasis.

“It could.”

“Steal a march on these Eastern schools,” he added with a bit of bravado.

“I like that. Steal a march.”

“We would be heroes,” Birge insisted.

“We would.”

“Like a rook sacrifice.”

“Yes,” said Hall, a bit surprised at the verbal flourish. Birge was not a man of verbal flourishes.

“You lose a piece but you gain the initiative.”

“And you may very well win the game.”

“You may very well,” said Birge quite satisfied with his reasoning.

They were ready for their cigars now. And there was Sam. How on earth did he do it?

Chapter Five

A Meeting Of The Minds

He bought a beat-up mongrel of a car and drove it to Berkeley California. He wanted to be top dog and he knew he had no peer in theoretical physics in California. He veered south in Chicago on the almost brand new Route 66 heading for the desert, New Mexico, Katharine, her hacienda on the Pecos River. He ran that car as hard as he dared. One night in the interregnum before dawn he pulled off the two-lane concrete highway and stumbled out of the car to breathe in the cool still air. The stars of the Milky Way poured across the sky. The distant lights of the galaxy seemed to be as near as his reaching fingertips as if he might pluck them down and gather them in his arms. He fell asleep in the backseat and woke in a baking oven of dry heat. He

kicked open the door, slid out and stood again in the sand of New Mexico. The Sangro de Cristos to the west were silent as gods. Spiky grasses fringed a meadow of yellow and purple wildflowers. Insects buzzed. He thought he saw a herd of wild horses on the horizon turn to stare at him. The world was charged with spirit, like music rising out of the earth. He thought I could go mad here and be better off for it. He thought of Los Alamos high on its mesa cut off from civilization and he heard a voice. No, that wasn't right. He didn't hear it. It came from within. It spoke within him. Was that hearing? Imagining? Intuiting? No, it was knowing. He knew a voice that said, "Here. This is the place." He shuddered and shook, and then he laughed a tremendous laugh of recognition and thanks. This was what the Hebrews called the voice of an angel, what the Christians called Grace, what the Hindus called Brahman. He knew it directly. More deeply than he knew the quantum physics that held the world together. Beyond mathematics. Beyond science. Beyond himself. He lay down and wept, tears running down his cheeks. Was this, he wondered, the beginning of enlightenment?

Or would it never come again?

Lawrence, he quickly discovered, was a hedgehog. He knew one big thing. One big thing which as it happened kept getting bigger and bigger. The first one, which predated Oppenheimer at Berkeley, had been four inches in circumference. Some wag had dubbed it the cyclotron. Tron was one of those suffixes that had found its way into the physicists' lexicon and

was proliferating. Lawrence, so they said, did not find it funny until he did and then he found it useful. Well that was Lawrence for you right there. He grabbed an opportunity when it presented itself. A pithy phrase, a big round number in cash or electron volts, these things could be used to raise money for his research. Atom smasher was another. What a big beautiful phrase it was, a stick-to-your-ribs kind of phrase. His physics and his math were inferior, but his ever-increasing cyclotron would win him a Nobel someday. It was just a matter of time. Made of glass and bronze and sealing wax it looked like a cross between a rear-view mirror and a medieval torture device. Something out of Buck Rogers in the funny papers. Lawrence said he built it for twenty-five bucks or something.

The idea was quite good, he had to admit. Each time round the device, the particles got a magnetic boost which made them go faster and widened their path a bit. So you got this lovely spiral pattern of speeding particles. And here was the genius part: the increased speed of the particles was canceled out by the wider path so the particles all went round the device in the exact same amount of time; you could boost all the loops of the spiral with one magnetic burst and the spiral pattern was preserved. Then you shot them out of the cyclotron at an impressive speed with enormous energy and you bombarded something with it, nitrogen for example or lithium. The math was quite nice, clear and simple:

$$MR\Phi = eRH.$$

It was lovely in fact in its terse beauty. Well done, Lawrence, but really this was schoolboy stuff. Chalk it up to his tenacity not his mathematical brilliance

Oppenheimer wasn't such a bad fellow. But he never really gave me the credit I deserved. Everyone had been bombarding the lighter elements with positively charged radiation from heavy elements like radium. The radiation had a fixed amount of energy. Something like 5 million electron volts or 5 MeV. A pittance, and it could not be boosted. It would only go so far in revealing the innards of the atom. And it only worked on light atoms with few electrons. Heavier elements with more electrons had a negatively charged electron shell that could not be penetrated. A heroic advance was in order. Enter Ernest Orlando Lawrence, aka me. I had been reading a German review of physics. Not that I read German, I don't really. But I saw Wideröe's diagram and it hit me like a baseball bat. What can I say? I just saw it. I was looking at Wideröe's back-and-forth pump as shown in his clever diagram and then an image popped into my head. A spiral, an ever-widening spiral of protons speeding through a magnetized chamber. Like a spiral galaxy spewing stars into the Firmament. So I started writing down the mathematical facts as I knew them. An hour later I had winnowed it down to this:

$$MR\Phi = eRH.$$

Maybe the most beautiful thing I had ever seen. How can I describe the thrill of seeing an equation I had written on a piece of paper and know that it described the world with perfect certainty, that it predicted the future with unerring accuracy and that it held the key to my future in its Greek symbology. I imagine it is something like the thrill Michelangelo felt as he chipped away at the marble and found King David within.

The formula said quite simply that the cyclotron as I envisaged it could achieve enormous energy and really smash the living daylights out of some unsuspecting lump of lithium or nitrogen or what have you, it didn't really matter to me. These clever boys with their matrices and integrals could figure out the rest and what it all meant for their quantum physical world. But first they needed my cyclotron.

That's what I promised the finance boys when he asked them to purchase an industrial-grade 10,000 volt magnet. I said I could turn 10,000 volts into 100,000 volts presto chango abracadabra.

Theoretically, Robert liked to remind himself, it should have worked from the get-go, but Lawrence couldn't get the damn thing going. The problem was how to keep the particles going around in a flat spiral. If they tilted up or down and flew out of the top or the bottom of the apparatus, the whole thing was useless. Lawrence needed a flat spiral stream of particles to point at the target or his rather good piece of thinking would be wasted. And he couldn't solve the problem. Then his man Livingston went to work on it. Stanley Livingston, wasn't it? Poor fellow lost in the mists of scientific history. Lawrence had seen to that. In a remarkable feat of

sheer cussedness and determination, he and Livingston had tinkered and toyed and re-jiggered the thing in ways that only a Wilbur or an Oliver Wright could appreciate or a Thomas Edison. Everyone understood the principle of flight, but no one could make an airplane until the two bicycle mechanics threw themselves into it. One didn't like to deflate Lawrence's contribution, or rather one did, but one did not want to seem all *schadenfreudig* about it even though one couldn't help oneself. Honestly, he and Livingston were a pair of gifted atomic bicycle mechanics trying to smash an atom in their ramshackle white clapboard laboratory in Berkeley, just as their predecessors had smashed the boundaries of manned flight in their garage in Akron, Ohio. He didn't want to sound dismissive of the program, but let's be fair. Livingston shimmed and tilted and compressed the magnetic disks in counterintuitive ways with tiny exacting differences, and then hey voila he had done it. And protons came barreling out of the 4-inch cyclotron with 80,000 volts. This was a stunning advance in atom smashing given that radium alpha particles weighed in at a now puny 5 volts. And the whole thing had set the University back about twenty-five bucks.

Suddenly my name was on every tongue. And my formula was inscribed on their hearts. But I knew immediately it was only a beginning, a prototype, a proof of concept. A bigger and better cyclotron was next. What for? Who knew? Who cared? Let the Germans and the Brits figure that out. They said they wanted electron volts and I would by god give them electron volts.

And let's face it Lawrence and Livingston solved many seemingly insurmountable problems and Lawrence had raised prodigious amounts of cash with catchphrases and his talent for publicity. The Radiation Laboratory was its name, but they called it The Rad Lab. Brilliant stuff. And the scene in his lab was something out of Buck Rogers or Flash Gordon. Sparks flying, machinery zizzing. Smoke wafting. Come to think of it, Lawrence had that cornfed farmboy Flash Gordon look about him. If he said he was going to take this ship to Planet Mongo, everybody in the lab became Dr. Zarkov and climbed aboard. And there were plenty of Dale Ardens clamoring to get on board his spaceship as well. The lab stank of transformer oil that soaked into the wood floors. The damn thing used so much power it shorted out the neighborhood on a regular basis, leaving a smell of ozone in the air. They used a garden hose to cool the apparatus when it overheated. That is if they caught it in time. Otherwise it caught fire and had to be put out with a fire extinguisher. Everybody in the lab smelled of scorched insulation.

He went down there one evening looking for Lawrence who was working on his new 11-inch cyclotron that had cost a serious \$800. Some kid on the team was holding a lightbulb in one hand and reaching for a water pipe with the other. When he got a hold of the pipe, the lightbulb in his hand began to glow.

“Hey everybody. I'm conducting electricity,” he shouted.

He looked at the kid with alarm.

“Hey Professor. It's because we've got a ton of radio waves coming out of the cyclotron. It goes right through ya!”

The cyclotron was humming and zapping and emitting a blue beam of ionized light. Ming The Merciless would have been intrigued but not impressed. His particle beam from Mongo was capable of destroying Planet Earth. What good was Lawrence's tiny beam? That was not a rhetorical question. Lawrence had no clear idea what to do with his particle beam. He strode in dressed for dinner with his bowtie hanging slack from his wingtip collar and his tux in one arm.

"I called you guys twelve times. I want an update. Why do I have to come down here and do this in person when God has already invented the telephone?"

"EOL!" they shouted almost as one. His initials; he loved that.

"What brings you down here?" Lawrence asked him in a manner somewhere between suspicion and amusement.

"I figure if I snoop around here for a while, I might invent a theory that can be tested by your cyclotron, Ernest."

"That would be a big help, Oppie."

"It's a rotten job," he said, "but someone's got to do it. Otherwise what good is it?"

"What good is it?" Lawrence nibbled on the bait. "What good is the sun? What good are the stars?"

"The sun makes life on earth possible."

“Did God have man in mind when he made the sun?” Lawrence asked a fair question. “No, he made the sun first and then he thought I’ll make a man to bask in its glow. I make the cyclotron. Someone will find a use for it.”

You couldn’t argue with a man who compared himself with the Prime Mover.

After he had raised the money to buy the 10,000-volt magnet, the cocky bastard went back to the board of directors at Berkeley with a new request.

I got wind of an abandoned 80,000-volt magnet in a warehouse on the wharf in San Francisco. The thing was in atrocious condition with rust and wear. I said we must have five thousand bucks to refurbish the magnet and build an 11-inch cyclotron and we (by which I meant I) would create alpha particles with 300,000 volts. By then I was unstoppable, insatiable. I designed a 27-inch cyclotron that emitted particles with 3.5 million volts. It was quite clear I could do no wrong. 8 million and 16 million volts swung into view.

And then he said he wanted to generate particles with an energy of *one hundred million volts*. He said he could do it. He knew he could do it. He saw how it made everyone’s eyes light up. A hundred million volts. It was like “Next year in Jerusalem.” Like “Tippecanoe and Tyler too!” Like “Uncle Sam Wants You!” It was irresistible. This was where Robert felt he had to step in and speak to Lawrence man to man. He had to pull the arrogant dreamer aside and talk some sense into him before he ruined everything.

“You must realize, Ernest, a hundred million volts is not possible in relativistic terms. To achieve that kind of energy in the cyclotron the alpha particles would have to approach the speed of light. You know what happens when matter approaches the speed of light.” He smiled faintly, sympathetically.

“Of course I do.” Lawrence had replied very quickly.

But It was quite clear he didn't have the slightest idea what happened to alpha particles as they approached the speed of light. Or didn't care. He now spoke to him as professor to student. “Ernest,” he began in as offhand a manner as he could muster as if he were reminding his student of facts he knew quite well but may have overlooked. “It would take all the energy in the universe to accelerate an alpha particle to the speed of light. Right? You follow my train of thought here? The particle would approach infinite mass, the mass of the entire universe before it reached 100 million electron volts. At some point it would be rather difficult to move such a particle even given your ingenuity. Time would come to a stop for this particle as it approached the speed of light. It would witness the heat death of the universe before it could achieve one hundred million electron volts. You can't contradict Einstein.”

“Oh come on, you have no faith, Robert. It can be done! We need the right attitude and we need the right amount of money. I have solved every problem that that has got in my way.”

Yes but Ernest, I don't think you can solve relativity. That is the whole point. It cannot be persuaded or bribed or hustled or promoted. Forgive me for speaking frankly.”

“You are thinking like a theoretical physicist. I am thinking like a man with a machine.”

Time would stop for an alpha particle, but Lawrence would not stop for time.

“One hundred million volts” became Lawrence’s mantra. None of the money men on the board of directors understood relativity. And no one bothered to ask Oppenheimer’s opinion.

I will only say of our differences that Oppenheimer was supremely talented at his *metiér*, but in other ways he was lacking. One day in our general fervor we drove out to the seashore in Marin County. I had a honey of a roadster at the time, an MG K2 that went like the dickens. We trekked up and down the shore for hours taking in the sea air and playing with the seabirds that congregated around us. There is something about physical exertion that raises your spirits and loosens your tongue. We had been bantering about women. Regarding women he was fairly normal.

“What about the girl in the commissary?” he ventured. “The way she looks at me is provocative. I think there’s something going on between us.”

“You? She’s not interested in you, Robert. She’s interested in me!”

“The girl in the commissary? The one with the ponytail and the fake pearls?”

“She’s not interested in you. She’s interested in me.”

“Prove it,” he said.

“I will. I will ask her out tomorrow.”

“She won’t go out with you.”

“What about what’s his name’s wife,” I countered, “the one who had us to tea on Sunday? I mean she is a piece of work. If I weren’t a man of some morality, I would be in there in a shot.”

“You can’t be serious, Ernest. She stood over me pouring tea until I nearly drowned.”

“What is that supposed to mean?”

“It means she was waiting for me to engage her in conversation. She was waiting for me to tip my hand.”

We could go on like that for days and often did until I told him I had taken such and such or so and so the movies. He knew what that meant. Taking a girl to the movies. Now that was my idea of heaven. The things you can do in a movie theatre. God bless you, Mr. Edison. And you too, Mr. Griffith!

“Ernest,” he said changing the subject, “I am at a loss to explain what is going on with my class.”

“How so?” I asked.

“Well you see I had ten good strong grad students in my class at the beginning of the semester but only three are coming back for the second semester. I’m a little embarrassed to bring it up. Maybe you can enlighten me. Am I overworking them? Am I not picking up on their confusions? They seem to be deserting me.”

“Well,” I replied, “I don’t think there’s any mystery about it, Robert.”

“It’s a mystery to me.”

“It’s the stock market crash. Everybody on the staff is seeing it. Students are packing up and going home. Everybody’s saying there’s a depression coming. Or it’s already upon us. The country’s going broke. No one can afford to go to school anymore.”

He looked at me a moment.

“Stock market crash. Yes I think I heard about that,” he said in an odd tentative way. I thought at first he was joking. “Tell me about this stock market crash.” He didn’t joke that way. I was completely shocked.

“Black Friday,” I said. “You know about Black Friday.”

“Not exactly.” But it sounds very bad. Is it as bad as it sounds?”

I wasn’t sure where to begin. This was like telling a teenager about the facts of life. “Stock market went belly up. Brokers jumping out of windows on Wall Street. Surely you’ve heard of it.”

“Yes but what does it all mean? I guess I haven’t been paying attention.”

No I guess he hadn’t! I stared at him. I knew his family had money, but so did a lot of guys who went splat in the streets of Lower Manhattan. So I gave it to him in broad brushstrokes. He shook his head.

“I thought it was me.”

“No, I can assure you it isn’t you. One of my boys in the lab says your students revere you the way Wittgenstein’s students revere him at Cambridge.”

“Wittgenstein? Who is Wittgenstein?” Robert asked.

“I’ve no idea, Robert, but I could tell from the tenor of the fella’s voice and the sparkle in his eye that you are in excellent company with this Wittgenstein.”

“Am I, indeed.”

He remembered that day quite clearly. Ernest took him for a typical male when it came to women and he obligingly played along, not that he minded the game, but more importantly, he did not know how to reveal to another man his veneration for women and love, so he kept it hidden within him. Let Ernest have his movie theatre dalliances, he was after something else entirely.

David was really odd. All of his grad students were, each in his own special way. Their oddities were like the oddities of monks who had forsaken the world, who went days and days fasting, devoted only to their prayers, who mortified the flesh and glorified the spirit. He had come to expect that of them, to welcome it. After all he had been particularly odd himself. But David was of a different order. It gave him a compelling quality, even before Robert had a chance to really size up the young man’s work. His name was David Bloom. Actually, the name on his transcript was Duvid, but he called himself David at Berkeley. A small matter, but it was

the accumulation of small matters, that hinted at the greater matter in whose gravitational field they all came together, like the way his fingers and thumbs twitched in his lap when he was doing a mathematical calculation. He didn't so much look you in the eye as look for your eye like it was a blinding light that could not be viewed directly. He squinted fiercely and cocked his head from one side to the other as you spoke to him as if he were trying to see the face of his torturer. He lived by night and mostly slept by day except for his classes and the necessary errands he ran to keep himself in food and clothing. He was wiry and angular, a bit stooped in the shoulders. When he hooked his round spectacles behind his ears to read, he reminded Robert of a character out of Chekhov, a studious revolutionary who loved his country and hated his Tsar. He worked in the basement of the library reshelving books in the stacks where no one paid him any mind, where he could stop to read an intriguing book from his cart before tucking it back into place, crouching in a favorite corner or sitting on the stool he used for reaching higher shelves. Some days he managed to reshelve not a single book as he read widely among his favorite topics which included medieval romance like *The Song Of Roland* (in the Old French), the Post Kantians, tales of Nordic Mythology especially Ragnarok, the historical works of astronomy from Aristarchus to Copernicus and Galileo and the commentaries of Rashi in the Talmud.

Robert had said to the class that he didn't like to teach mornings or for that matter afternoons. Evenings he said were best for the study of physics. Late nights he said were even better. The hours between 2 am and 5 am were the hours when he did his best thinking. That must have been the start of it.

He was sitting up late in the chair by the bed smoking the last Chesterfield of the day when he realized someone was attempting to open the window. He watched patiently as the dark figure jimmied and shook the often stuck window until he had loosened it and got a hand beneath the sill. He put down his book and noted that he didn't have anything like a weapon with which he might repel this intruder unless he counted his tennis racquet. But it wasn't an intruder. It was a visitor, David with his dog, a Welsh sheepdog as near as he could tell. Maybe it was just a handsome mutt.

"Your door is locked, so I came in the window," he said once he was in.

"I wasn't expecting visitors," he replied calmly attempting simultaneously to keep the amusement and the alarm out of his voice.

"But you said you were teaching late at night."

"Oh I see. You are taking me up on my invitation."

"Yes yes!" he replied and he began to pace the room with his dog whose name turned out to be Tommy Gun in honor of Thomas Edison because his father had been a telegraph operator in Chicago not that Edison had invented the telegraph but electricity you know and the light bulb and his father worshiped Edison before the market crashed and he lost everything, well not everything, they had scraped together enough for his tuition after the partial scholarship.

In the silences, Robert heard his soft grunts that sometimes sounded like gasps as if the world continuously surprised him. It shaded at times into the friendly growl of a small dog with a bone. It could also be an abrupt sigh like a man with aches and pains stepping into a bath. It

could be the peaceful murmur or a sing-song lilt. But it always stopped when he began to speak in a rush of staccato rhythmic phrases, interweaving melodic themes as he changed the subject unexpectedly, like Stravinsky he thought, although David seemed to think he was Rachmaninoff.

Robert couldn't imagine that this young man possessed the clarity of mind he would need for his graduate seminar but somewhere in the middle of his apology if that was it was, perhaps it was more in the way of an explanation, he asked a startlingly good question.

“Is the neutron what you get when a proton and an electron are fused together or are the proton and the electron what you get when you split the neutron apart? Or am I asking you which came first the chicken or the egg?”

A man after his own heart. Because Robert loved the math but what he really loved was the interpretation, *the meaning of the math in the real world, the commentary on the Law so to speak.*

“You are asking me if the neutron is an elementary particle and this is an excellent question. Are you familiar with Chadwick's work at the Cavendish lab in Cambridge?”

“Chadwick, yes, Chadwick, well, what Chadwick did was this.” And David proceeded to rehearse a symphonic tale he seemed to have told himself many times before. He recounted in rising and falling cadences how Chadwick had read how some Germans had bombarded beryllium with alpha radiation from polonium and got extremely high energy photons as a result. But Chadwick thought no no that can't be right. This result couldn't be photons. It didn't sound right to his practiced ear. And here David stopped and scribbled down a calculation that showed how much energy the Germans were talking about. And then the Curies had run this so-called

photon radiation through paraffin where it shook protons loose and come on *photons* can't release *protons* with high energy like that so it must be something else and how Chadwick had stayed up night and day for two weeks bombarding every substance known to man with these so-called photons and did painstaking measurements with improvisatory ingenuity, some of which David recounted in detail, and the results all pointed to a new particle about the size of a proton but with a neutral charge, which he dubbed the "neutron" and the name stuck, and they were probably going to have to give a Nobel Prize in the very near future because of what he did in those immense two weeks of work.

"That is a very compelling story you tell, David. And more or less accurate."

David looked at him as if he didn't quite know whether to say, "Thank you," or "Well of course it's accurate. Why wouldn't it be?"

"You remind me," he continued, "of myself at your age, the way I memorized the Bhagavad Gita for its beauty and subtle truth. So I would have it at my fingertips whenever I needed it."

"Uh huh. Uh huh. Well ok!"

"I find it very helpful to me to have interests outside of atomic physics. It gives me a sense of balance and perspective on life. How about you?"

David began to talk about the ancient body of oral commentary on the Torah that had been passed down from generation to generation until the Romans destroyed the Temple and then it was written down and became the Talmud which was subject to its own oral commentary

which was eventually written down as a commentary on the commentary on the Torah. He compared this spiritual phenomenon to the triumphant march of the human spirit that was revealed in the works of Hegel and of the predecessors to that vision as contained in the Post Kantian critiques of Fichte and Schelling.

“These are intellectual endeavors in which you place great value, aren’t they?”

David looked at him questioningly. There seemed to be something further, something of great importance of which he hesitated to speak.

“So many great thinkers,” Robert said, “think their great work lay elsewhere, that is to say, not in the work that has come down to us as genius. Kepler thought his celestial spheres were his greatest work not his laws of planetary motion. Descartes thought his Corpuscular Theory of Light was his great contribution to mankind, not analytic geometry or *I think therefore I am*. Newton thought his biblical commentaries were greater than his mundane Law Of Gravity or his invention of the calculus.”

He could see that David was not sure where he was going.

“The irony is that it is these other works that propel them, that haunt them and provoke them are the minor works they give us as their second thought, as parlor tricks that will amuse us. But those “minor” ones were the ones we really needed.

David went still and looked away, but Robert could see he was working on something. He had noticed in his few years teaching that when his students looked right at him in profound

silence they were thinking to themselves in words, but when they looked away it meant they were thinking to themselves in images.

“This is something, I am in the early stages, it may not amount to anything...”

“Yes?”

“Well ok...” He took a deep breath and fingered the fringes of his garment. “There are numerological values associated with the names of the streets in Berkeley and there are numerological values associated with their geographical placement. “He paused. “And these may be connected in a deep mathematical way with the Periodic Table on a quantum level.”

Robert sighed and smiled. “How so?”

“Well I’m only beginning to think about this but I think it has something to do with the water pressure in the fire hydrants. I have been taking measurements.” He reached into his pocket and took out a sheaf of paper that seemed to have been folded and unfolded so many times that the paper had gone soft as cloth and the creases deteriorated to the point where the whole sheaf might come apart at the seams if it were handled without care. He unfolded it deliberately and delicately and then he stopped. Robert scanned the visible pages for clues to his sanity. Tears filled David’s eyes. “I don’t think I should show you this. Forgive me.”

“It’s quite all right, David. I think I understand you.”

“How could you possibly understand me. I don’t understand myself.

Robert had an urge to turn to the philosophical issue of immediate self-knowledge at it has been propounded by Descartes and others as the certainty at the center of the world and how

that dogma has been challenged by Freud whose work points to the fact that we are all but opaque to ourselves whereas we are transparent to the others with the proper psychotherapeutic training. But he didn't.

“Why did you ask me that? Did you think I was hiding something?” David asked.

“I ask that question of all my new students. But I have never received an answer as intriguing as yours.”

“Is it intriguing or is it obsessive?”

Instead of answering directly he said, “This looks like matrix mechanics. These are 12-dimensional matrices that you have multiplied together. How long does that take you?”

“I do them in my head.”

Robert wasn't sure he understood. He wrote down a complicated piece of matrix algebra. “How would you go about solving this?” he said sitting back.

David wrote down the answer before Robert's back hit the chair.

“How did you do that?” Robert asked with rising excitement. “Assuming you have the correct answer.”

David sat up straight. His fingers and thumbs jerked and twitched. “No, it's right.”

“How do you know?”

“I just checked it.”

“How?”

I just see it.

“What are you doing with your hands? Are you counting with your hands in twelve dimensions?”

“Sometimes I use the abacus.”

“An imaginary abacus?”

“I don’t really need it. It’s mostly a habit.”

“I want you to come back. I think we can work together. Here. At night. Privately. I think you have a proper thesis in you and I want to help you get it down on paper and out into the world.

“On what topic?”

“On the nature of the neutron, David. What do you think?” David stood up and looked at him as deeply as anyone had ever looked at him before, as deeply as Emma on the island of Corsica, as deeply as Smith in the Sangre de Christos.

That was the beginning of a pedagogical partnership that lasted some two years. In the beginning he was quite unsure whether David would rise to the challenge. He had only the hunch which came from the impressive detail of David’s Chadwick story and the startling calculations he had seen on one of the pages he had briefly unfolded. It was a series of calculations showing the slight variance in the atomic energy contained in two hydrogen atoms versus the atomic energy contained in one helium atom. The numbers should have matched, but they didn’t. This was a calculation known to very few people and it appeared from a quick

glance at the method he used that David had derived the inequality in an original way. Perhaps he had done the prodigious calculations in his head with the help of his fingers from time to time. It was one thing to have the mathematical velocity of an idiot savant. You heard about that all the time. There was a man in Illinois who watched miles-long freight trains go by and as they rumbled past, he added up the serial numbers painted on the sides of the boxcars, never making a mistake. But David was not an idiot. He was clearly a savant.

Although the verbal tics and the headlong verbal virtuosity like a jitterbug dancer in the spotlight remained with David, it was Robert's intense pleasure to watch his demonic notions of numerology and water pressure pass away from his consciousness to be replaced by the mathematical physics of the neutron and its relationship to the proton and the electron and to see his thesis published and recognized for its depth. It was his pleasure to help him find his first teaching job at a school in the Midwest. He tried to stay in touch with David, but he knew that would not be an easy thing to do.

Chapter Six

The Emigrants

Edward Teller's earliest memories had to do with numbers. Not that they were important to him when he was six or seven but they were so clear, so vibrant, so solid. Unlike people.

Unlike his father who worked so hard he sometimes thought he was invisible, unlike his mother who never had a kind word, unlike the children in his classroom who thought him odd because his hand was always up and you could see on his face he had the right answer and he really liked being right all the time. They all seemed to think there was something wrong with him. They singled him out and isolated him. Even his teachers found him tiresome and not just because he occasionally corrected them. It was the way he corrected them. There was a fierce look in his eye, a sense of pride that did not befit one so young. The only way he knew how to respond was to keep raising his hand and always get it right.

The house in Budapest was large and airy. When he saw it in his memory it was floating in a dense fog set back from the wide avenue with tall winter trees stripped of their leaves, like the pictures one saw of the Russian Front. When he was ten, it had all gone so swiftly from life to death. First it was the roving crowds celebrating the downfall of the Empire, singing and laughing, bouquets of flowers, women dancing with strangers in the street of the Castle Quarter that surrounded Buda Castle on its strategic hilltop. Then it was the charged up marching and the singing of the *Internationale* and then it was the Commune. The Commune, that was the word that frightened him the most. The soldiers returned from the prisoner of war camps in Russian with news of the glorious Leningrad Commune.

His father Max told wild and fearful stories of the Paris Commune of his youth. “People dreamt great dreams and then they died for their naivete.” It was all hard to put together. But he knew it meant violence and killing and no one could be trusted. “They called it a Commune. Everyone would share everything, but there was nothing to share except fear and starvation.” It meant they denounced you in public or maybe they denounced you in secrecy and dark men

came to your door. Or you denounced them first. He pictured himself standing in short pants in front of an enormous tall bench of scowling judges, raising his voice in denunciation, his fist in the air, his finger pointing at someone. “I denounce you, sir!” “How dare you, little boy?” “In the name of The Commune!” he would say. Or rather, he would *have to* say, whether he wanted to or not.

He stopped eating. He dreamt of strangers like wolves coming out of the woods as he tried to reach the open front door to close it, how he could never get there in time, their hands like claws as they came up the front steps growling, how he always woke up before he could slam the door in their faces before they could invade the house and destroy them. His father had to walk out into the countryside to trade clothing and household goods for food. “That’s a porcelain bowl!” his mother shouted after him. “Why are you taking the porcelain? They won’t even know what it is!” But he came back with a bushel basket full of vegetables, like something out of a fairy tale. And oh god the rumors of kidnappings and bodies by the roadside. Everyone knew someone who knew someone who had seen something they could only speak of in whispers.

On May Day crowds ran through the streets covering the parks in red flags, red drapery and red slogans in red paint. At dinner Edward waited for his father to speak. He wanted to ask, “Why are they having a revolution?” “Will they come to the house and take our things?” “Why can’t we leave?” “When will it be over?”

His father watched him so carefully he did not dare to ask. He waited till the end of the meal and then he spoke one short sentence, the only one that counted. “This will not end well

for us.” He spoke to Edward’s sad elegant mother, but Edward felt the words coming directly at him. “These are my people, these communards, communists, whatever they call themselves. “Don’t they understand how this looks? Don’t they know what people are saying?”

“They will blame it on us.” said his mother on the verge of tears.

“Us?” Edward asked. Were they going to blame it his father and his mother?

“On the Jews,” said his father. He looked at Edward with a bitterness he could taste in his mouth. “They will tell lies. They will twist the facts. There will be no truth, only their truth.” Edward felt a shock so deep within that he knew it had to be true. “First they will say ‘Down with the proletariats.’ Then they will say, “Down with the Jews!”

When the backlash came, the sounds of tumult and riot rose and fell in the streets like artillery fire coming nearer, then farther, nearer then farther as if it were seeking him out from beyond the barbed wire of no man’s land. Cars roamed the streets bristling with Lenin Boys brandishing rifles, taking potshots, making noisy, belligerent arrests. Every time you turned around Admiral Horthy in his ridiculous brocaded epaulets, his chest dripping with medals, was reviewing gray ranks of rifle companies marching down the avenues, their droning cadences fogging the brains of the grim citizenry.

Lying in bed at night Edward wondered if two plus two still equaled four. The fear was like a snake. The Red Terror had been replaced by the White and now the real killing commenced. The Jews were indeed to blame. They were hanged and shot and hounded out of Hungary if they could find a way to leave. Edward’s father could not. So they stayed.

At the Minta Gimnasium in Budapest, it was clear to the faculty that he had the promise of genius, like Leo Szilard and Johnny von Neumann before him. A professor from the University took up the challenge of tutoring him privately when the mere mortals were taking their algebra and calculus classes. Max introduced him to Szilard and von Neumann, both in their twenties, sons of Max's good friends, both on their way to careers in physics in Germany far away from the blockade to their advancement as Jews that the regime had erected in Budapest, both impressed with Edward when they returned to Budapest and spent time with him at Max's request. Von Neumann was a wizard but Szilard was a warlock. They shared with him their love of mathematics and their hatred of the mountebanks and tinpot dictators of the anti-Semitic Horthy regime. They recognized in Edward's look the blank stare that took nothing for granted, the silence that trusted no one who held political power.

Leo was at the blackboard checking to see if Johnny was right. Johnny was calculating the value of pi to the 200th decimal place in his head. Leo couldn't keep up. Edward said, "You're cheating. You've memorized it."

"Why should I memorize it when it's so easy to calculate in your head?"

"He's amazing, isn't he?" said Leo.

"When I was twelve my father had a friend, a professor who gave me a book by Euler called *Elements of Algebra*. Now that was amazing," said Edward to impress them.

"Yes, we know the book, Edward. It's not exactly a secret," said Leo.

"It was to me. And then I read it and then it wasn't."

“Pretty good for a first attempt to explain algebra,” said Johnny with a shrug.

“Pretty good? It’s brilliant beyond words. After Euler, they just cleaned up the details,” said Edward. “Anyone can write the second book of algebra. Only one man can write the first. That man is the genius.”

“That’s what I want to do,” said Leo. “I want to be the first. I want to be the guy who leaves the cleaning up to lesser minions. To you guys for example.”

You should live so long,” said Johnny.

“But you can’t do it in Budapest, Edward,” said Leo.

“Yes, I know,” said Edward.”

“In Budapest there are no teaching careers for Jews.”

“Yes I know,” said Edward.”

“There are no research careers for Jews.”

“He knows!” said Johnny.

“You may get into the University but you will die there without a degree. Everyone will die here without a degree. Because we are Jews. That swaggering old man Horthy and his Jew-baiting thugs. Everywhere you go you’re walking on thin ice.”

“What are you talking about, Leo?” said Johnny.

“We are under siege here,” said Leo.

“You can’t live your life looking over your shoulder, listening for soldiers shouting your name,” said Johnny

“You have to be vigilant,” Leo insisted.

“I really don’t know what you’re talking about. All of Europe is under a siege of some sort.” Change was the oxygen he breathed, tinged with the nitrogen of militant agitation. He had learned to ignore it. It was a lot of noise but it had very little meaning. Life went on. “But you have to get out, Edward. Get yourself to a good German university.”

A hot cloud of anxiety condensed into a metallic nugget of hatred within him. Someday he would mine that nugget and it would make him wealthy.

“And don’t sulk,” said Leo who had done his share of sulking at Edward’s age.

“Yes, stop sulking,” said Johnny who still found time to sulk when the mood was on him.

At the train station on his way back to Berlin, Leo said to him, “We’ll meet again in a better world.” He was joking but he wasn’t.

Einstein was not a general. He was more like a sniper. He stood apart from the military campaign of quantum physics. They were an army of experimentalists giving results to an officer corps of theorists who constructed from them elegant edifices of thought and made predictions

for the experimentalists who could then confirm or contradict the theories with further experimentation, touching off another round of theorizing which required a further campaign of experimenting and on and on into the infinite. He was just Einstein and his blackboard. He sat alone on his perch and assassinated the scientific past. As a teenager he had asked himself what would it be like to be a photon traveling at the speed of light. That was the beginning of the solitary training that led to his single combat with Isaac Newton. Yes, there were a few thinkers whose work had helped him to find his impregnable perch: Michaelson, Morley Lorenz, Hilbert. But Einstein was a one-man war. Ironically it was he who had touched off the conflagration of quantum physics. His theory of the photoelectric effect was the first shot fired in that world war. He was the rabid Serb who had assassinated an archduke and set a continent on fire. But he never thought it would lead to twenty million dead.

There was nothing quantum mechanical about his special theory of relativity. And nothing quantum mechanical in his general theory of relativity. And there would be nothing quantum mechanical about the atom with its protons, electrons and neutrons that couldn't be seen as wartime propaganda, as a temporary fiction that he would explain away in due time. They were lovely men all of them, especially Bohr in Copenhagen. What a truly lovely man. Tall and awkward, quiet, immense and immensely sincere. As patient with him as he was with Bohr. They said his mother was Jewish. Well of course she was. Did he know that made him entirely Jewish in the eyes of the rabbinate and all these obstreperous young fellows who wandered around Europe looking for the well of knowledge to water their livestock? They were his wayward brothers. Born. Pauli. Oppenheimer and the lost tribe in America. Teller. Von Neumann. This fellow Szilard. And he was their Joseph. He wished them no ill will and he

hoped they wished him none in return. And these German boys Heisenberg and Schrodinger, so clever with their mathematical discoveries, Heisenberg who had reinvented matrix algebra to solve the atom, Schrodinger with his puzzling equation who did it all over again. Yes, they were German but they were honest men. At the Solvay Conference in 1927 he had taken on all comers. The disputation had been relentless but good-natured, intensely competitive but collegial. Those were great years between '26 and '33.

Then there arose over Egypt a pharaoh who knew not Joseph. One by one these great men of science were sacked from their university positions, relieved of their duties and responsibilities. They could contribute nothing now and nothing was wanted of them. As it was chiseled on stone monuments in the hieroglyphs of the new dynasty, they were “traitors, profiteers, usurers and swindlers,” to translate some of its milder decrees. Their Elders of Zion had written a Protocol. They were to be driven from Germany by any means possible. Or perhaps he was their Moses and they were his stiff-necked people. He would lead them to a promised land in Great Britain or possibly America if that were really necessary. In London Rutherford came down to help raise funds for Jewish emigres. Leo Szilard was telling everyone that the Germans would re-arm and another war was coming. He was also telling everyone about the possibility that bombarding unstable elements with neutrons could cause a nuclear chain reaction of immense proportions. So it was difficult to take him seriously. Yes, of course Leo, $e = mc^2$, but let's not be carried away.

When he finally settled on Princeton at the Institute For Advanced Study, he knew he might never see Germany again. As Herr Hitler strutted up and down the boulevards of Berlin, he renounced his citizenship. Again. John von Neumann had got to Princeton first. His was a

welcome and welcoming face. He thought of writing to Heisenberg and Schrodinger. You think you are safe. You are not safe. One day you will say something wrong or do something they don't like or someone will speak some obvious lie about you and they will come for you too. But he did not write. Whatever became of them, they had no one to blame but themselves.

The Institute was housed in a charming building of red brick with leaded glass casement windows framed in concrete, a sloping slate roof, red brick chimneys thrusting up into the sky and copper downspouts with creeping vines pouring down into a landscaped garden. From the hillside on which it sat, the building displayed the naïve pride of New World academia. They tried, god bless them, to make you feel they had been around a long time and they would be there a long time to come. Possibly they would. They had a lot of catching up to do.

Afternoons they all took tea in the oak-paneled common room, but this was no ordinary British tea. There were no Gwendolyns or Cecilys asking do you prefer one lump or two, there were no Algernons or Earnests recounting their weekend exploits in the countryside, no Lady Bracknells demanding to know what had become of "that handbag!" Instead, there were sharp, angular young men whose intensity filled the room like the black body radiation of Einstein's famous theory, each at his own frequency. Their skills at the polite art of conversation shaded towards complicated puns and limericks on the topics of relativity and quantum mechanics. They laughed explosively and joked derisively but with the innocent good nature of comrades, Einstein sweeping off his widebrimmed fedora, von Neumann lounging about in a chalk striped suit, probably hungover from the night before, Hans Bethe with his huge smile and enormous forehead newly arrived in New York and visiting Princeton for the day saying God Bless

America I can finally sleep at night. They conversed in German, Hungarian, Polish, and occasionally English.

Einstein had come to America to continue his work on a unified field theory of electromagnetism and gravity. He wanted no helpers, no hangers-on, no protegés. He worked alone. If anyone dared to work on a unified field theory of their own, they had best stay out of his sight and steer clear of his blackboards. He knew that many of them thought he was a relic, an ancient worn-out knight errant in search of some Holy Grail of his own invention. Better, he thought, to fail at classical physics, graceful and exact than to succeed at this ugly disaster of quantum mechanics in which atoms were mere clouds of probability.

One by one they all got out of Europe, Born, Bethe, Erdos, Pauli, Szilard, Rabi, so many more. One by one they came to see him, to take tea with him at the Institute, to retire with him to his office on the second floor, to admire the oak paneling and the large fireplace, and to ask him about his work and to tell him about theirs.

He sat in his leatherbacked chair behind a large desk with a humidior for his pipe tobacco sitting directly in the middle of his strewn papers. The pipe was in there somewhere. He placed his hands on the desk and felt about for it. On either side of the blackboard behind his desk, his carpentered bookshelves were filled not with books but with tottering stacks of papers and manuscripts loosely bound. Hans Bethe smoked a pack of American cigarettes and gasped at their harshness. "These cigarettes are an abomination but I do not care. Look at me. I am breathing again. I didn't realize how bad it was till I got out. I was holding on for dear life."

“I am so glad to see you, my dear friend. But these others... They come. They sit. They admire the view.”

“It’s all rather quaint, Albert. Hans looked out at the tops of the elms and fir trees that grew alongside the building.

“But in fact they come here and wonder how will I ever pluck the order of my unified field theory from the chaos on my office.”

“You are wrong. They admire you. They revere you.”

“No no no. That farmboy Lawrence was here with his tall friend Oppenheimer. They pretend to pay me homage when it is plain to see they are only curious and I still stuck on my unified field theory.” I give them a thought experiment, some paradox, that I hope will throw a monkey wrench into their quantum theories. ‘Imagine two photons are traveling on parallel lines...’ ‘Suppose an alpha particle disintegrates...’ ‘Assume that a gram of radium is bombarded...’ I truly enjoy the look of desperation in their eyes when they grasp the possibility that my paradox has merit.” He spoke with devilish glee. “They disappear right before my very eyes as they retreat into their minds to solve his problem. A day or two later they return or they write to me to say with smug satisfaction there is in fact an explanation for my paradox, that their quantum principles survive unscathed. I sigh. I shrug. I wait for the next victim. Anything to shake them out of their complacency for as long as I possibly can.”

“You must stop looking over your shoulder, dear Albert. No one is coming for you now. This is America. Europe is a million miles away.”

“But don’t you see, Hans? This is a rear-guard action to keep them from overwhelming me as I struggle to find a mathematical approach to this problem of gravity and how to merge it with the forces of electrodynamics. Sometimes I think I will go mad. Where are the tools I require? When I needed Riemannian geometry for relativity, it was there like a miracle. Where have they gone, all the miracles? Where is the inspiration I used to feel in the Swiss Patent Office?”

“Ah well. We were so young.”

“In those days new ideas poured down from the sky like rain. What has become of my brains?”

He had bathed in that rain. Hot or cold, drizzle or downpour, it all washed over him, and what he couldn’t use immediately fell into a rain barrel for the next dry season.

“You mustn’t talk like this. There are great things ahead for you.”

“I haven’t done a decent piece of work since ’26.” Now he sat in silences that were vast and painful to endure.

“You have done great work the likes of which has never been seen and never will again. You have given us the Special Theory of Relativity.”

“Anyone could have done that. It was in the air. It was waiting to happen. God was looking for a soul to inspire and he found me.”

“No, but Albert, your theory of gravity. No one could have seen that but you. That was genius. That is genius. That will always be genius. God did not give that to you. You took it from Him by the sweat of your brow. You saw what only He has seen.”

“You are very kind to me, Hans. It is a great pleasure to see you here in America. Forgive me, I have scarcely asked about you?”

“I am teaching at Cornell. It is foreign to me. The young men go sledding on their lunch trays outside the dining hall. They crash themselves into the walls of the building. It is supposed to be great fun. They all wear slings on their arms.”

“Do they do a lot of drinking at Cornell?”

“Professor, I hadn’t thought of that!”

It pleased him to make Hans laugh. They shook hands and bade each other *auf wiedersehen*. He felt the sadness overcome him. How, he wondered, would the years go by? He would continue his search for a unified field theory. He suspected he might never succeed in finding it. Perhaps it was beyond human understanding. Perhaps God held it in reserve to humble his upstart soul. Perhaps He would answer him out of the whirlwind saying:

Who is this that darkeneth counsel by words without knowledge?

(It is I, your humble servant, Einstein.)

Gird up now thy loins like a man; for I will demand of thee, and answer thou me.

(I will.)

Where wast thou when I laid the foundations of the earth? Declare, if thou hast understanding.

(I do not know.)

Who hath laid the measures thereof, if thou knowest? or who hath stretched the line upon it?

(You did.)

Whereupon are the foundations thereof fastened? Or who laid the corner stone thereof?

(You did.)

Hitherto thou shall come but no further.

(That is what I fear.)

Hast thou commanded the morning since thy days?

(No I have not.)

Does the hawk fly by thy wisdom, and stretch her wings toward the south?

(No, the hawk does not fly by my wisdom, but men do. I know it's not the same thing.)

More likely he would hear only silence. And he would continue his search. He would travel down every path he could find. At least he could mark them all as dead ends for travelers

to come. “Kilroy was here,” as the doughboys had said. “And no, you needn’t bother.” That would be a worthwhile task. Not the task he imagined when they crowned him king of physics after the Great War. Then he could do no wrong. Then he thought God might reveal to him His divine countenance. But no, he had been too proud. God had taken him down a notch. Now they all suffered his fading genius with kindness and patience. If he weren’t such a genial fellow he would be utterly miserable.

Some said he was the first to see the threat in Einstein’s $e=mc^2$, that whoever had the misfortune to unleash the energy stored in the atom would be dead before he knew he had succeeded. Rutherford had missed this point entirely. It probably couldn’t be done, Rutherford had said, and anyway why bother? But Fermi saw the point. He could think like Bohr and tinker like Rutherford. They all said it. At his lab on Via Panisperna at Sapienza University in Rome, he and his Via Panisperna Boys reasoned that a neutron needed far less energy to penetrate an atom than the charged particles used by Rutherford and Chadwick at Cavendish and Lawrence at Berkeley. So he used neutrons. He did not require a cyclotron to probe and penetrate the nucleus of the atom. *Bene*. Because he did not have a cyclotron to play with. Mussolini couldn’t afford to give him one. *Bene*. At Sapienza, at Cavendish, at the Rad Lab at Berkeley, they all spent the 1930’s stuffing protons and neutrons into atomic elements making them fatter, heavier, less stable, more stable. But it never occurred to anyone they might split an atom in two, split it right

down the middle and end up with two much smaller atoms. Even Fermi had missed it. Not to mention what might happen if they did. He had bombarded uranium with slow neutrons. He thought he had created new elements, heavier than uranium. In Germany some lady chemist said no you have misinterpreted the results of these bombardments and in fact you have split the atom of uranium into smaller constituents. But really, she was a chemist, she had no theoretical framework for saying such things. Even Otto Hahn thought she was ridiculous.

The other threat he missed entirely was the threat of Mussolini. He had joined the Fascist Party when then made him a full professor in Rome. Why the hell not? He married a Jewish girl, Laura, her father was in the Navy. It wasn't a problem. They made him wear a ridiculous military uniform when they elected him to the Royal Academy. Fine fine fine. One or two of his Jewish colleagues had refused to join the party. So be it. He did not concern himself with politics. That kind of lofty idealism was for Einstein who was a world figure. Like so many successful men, he thought the success of his intelligence in his field of expertise gave him a corresponding intelligence in fields that were not of his expertise. Maybe it did. Maybe it didn't matter. Fermi did not have the kind of stature that would grant him any kind of political authority. Nor did he want any political authority. He wanted to bombard atoms with neutrons. Leave him alone. Let him get on with his work. He did not claim to be a man of the world. He was a man of science.

Chapter Seven

Jean

He was at a gathering in Berkeley at the spartan home of a man named Peters. The cigarette smoke was mixed with alcohol and the hot breath of conversation. Peters was a physician who had escaped from Dachau. He had seen things. He chose not to speak of it unless someone was being particularly pigheaded or willfully ignorant or smugly uncaring, and then he spoke in such detail that he commanded the room with the authority of a Greek messenger. "I am come from Thebes with news I dare not speak." "Speak, man, and you shall not be harmed, I vow." He spoke of men thrust in cages so small they died of shock in agony, their cries of rage and pain filling the air for days if they were strong. He spoke of bodies broken in tortures so severe the details entered one's dreams, of public rapes, whippings, hangings, of bodies dropping where they stood. A young woman listening on the floor with her knees clasped in her hands wept quietly. She got up, unsteady, and made her way out onto the porch where she was sick. He brought her a towel, a drink and a pillow with something decorative stitched into it because it seemed like a useful thing to bring. Clumps of grass and weeds thrust themselves up through the cracks in the sidewalk. The oak tree rustled in the breeze.

“Are you ok?” he asked as quietly as he could.

“Oh no please don’t look at me.” She turned away and folded up as he crouched down clumsily.

“No?”

“I don’t want anyone to see me like this.”

“I shall avert my eyes.”

“You don’t have to do that. I’m not God.”

“I didn’t think you were.”

“But I’m not a little girl.” She turned to him so quickly she must have seen his surprise at the intense beauty of her face. “I don’t go around crying like that. I know what makes the world go round, but he caught me by surprise.”

“He’s seen a lot.”

“Yes, my god. I’m ashamed of myself.”

“Here, take this.” He offered her the towel.

“It’s wet,” said.

“It’s for your forehead.”

She placed it to her forehead with her palms. “Oh that’s nice.” She glanced at him again. She was maybe not a god but very nearly so.

“And this,” he said, offering her the scotch. “For the taste in your mouth.”

She swilled it and then she spat it out. She swilled it again and then she drank it. “I didn’t know they did those things. The cages, the rapes, the torture.”

She was trembling. He handed her the pillow. She didn’t seem to get it.

“That’s for you to sit on.” She considered the pillow carefully. “No?”

“It’s embroidered,” she said and he understood it was not for sitting on, she had manners, you know. “You’re what’s his name. The physics department. Right?”

“Graduate Physics department.” That was not necessary. Why did he say that?

Sounds of emphatic conversation filled the brief silences, the bluster of a trombone, a shriek of laughter.

“I’m supposed to know your name. Everybody seems to know you.”

“Yes, hi, I’m Robert Oppenheimer.”

“Oh yes, they call you Oppie.”

“They do.

“I’m Jean. Jean Tatlock. I’m a medical student.”

“Hello, Jean.”

Hello, Robert.”

She offered him her hand from where she sat. Was he supposed to kiss it, to go down on one knee before her? How strange. What an odd unlikely thought. He had no idea what to say next. That was more typical. He felt himself about to withdraw. She must have seen it in his manner.

“Aren’t you going to walk me home?”

He looked down the street into the quiet dark.

“Yes? You want me to walk you home?” He fought to keep a grin from his face. He didn’t want to surrender just yet. But he did want to walk through the streets of Berkeley with her. Who wouldn’t? Perhaps a keener man,, one who could see farther down the road.

“I do,” she said.

A bit smug that. A bit, ‘Come on fellow. Can’t you see who you’re dealing with here?’

“You think I’m quaint? A bit stuffy? I’ll be entertaining?” That’s right. Put up a fight. The night was becoming, warm and windy. You didn’t get this kind of weather in Manhattan. The low stodgy houses were looking at them. They had seen it all before.

“No.”

“I bet he doesn’t know which end is up with women?”

“Do you?”

He was enjoying this exercise in obvious but not too obvious. This was easier than eigenvalues and matrix mechanics but the results were more far reaching. He pointed to her forehead. “This end is up but right now it’s down.”

They walked a while in silence. He was aware of her hand. She stopped under a street lamp. A car with a bad muffler limped along the street.

“Yes. Good. I think we can work with you.”

He didn't get that 'we.' “Do you really?” The night was very clear. The stars poured down their long ago light. He knew he would succumb.

“We have to crush them, Robert. They do not belong on this earth.”

She was looking him straight in the eye again and it hit him. “You're a Party member.”

“Of course I am.”

He leaned against the lamppost and laughed at himself. “Was that a Party meeting?”

“Of course it was. You went to a Party meeting and you didn't know it was a Party meeting?”

“Well now come on. Somebody said they were raising money for Spain.”

“Robert. Put two and two together.”

“Ohhhhh. Right.” She could scold and charm at the same time.

“You don't approve? You have scruples about the Party?”

He did. Of course he did. Perhaps he had a scruple about her. For some damn reason he said, “In Buddhism, there is a principle of harmlessness, *ahimsa* in Sanskrit. Do no harm. That is the highest goal.” Now that was not the right thing to say even though it was exactly the right thing to say. His words drifted up and away he knew not where. The night wrapped itself

around him providing him with comfort but also with its protection and its honor.

“Ohhhh.” She said. “Is that supposed to be wise and elderly, good counsel from your vantage point of hard won detachment? She grinned. She would play with him yet.

“It’s my starting point. As opposed to your dialectical materialism.”

“Maybe that was ok for India two thousand years ago. They didn’t have the Nazi Party wreaking havoc.”

“It’s a very old principle from the Bhagavad Gita.”

“If you have no social conscience you are worse than useless. You have to be incensed and outraged. And if you’re not, you have to learn how.”

Was anybody listening to anybody here?

She stopped in front of what seemed to be her house. She looked at the door. She looked at him. She took out her keys. He felt the clock counting down. Time for the old heave-ho, the old flea-flicker, the old end around. That was the extent of his football lingo.

“ “Do I?”

“If you’re going to hang around with me, you do.”

“Do you see us hanging around together? I’m a fussy professor of Physics.”

“But you brought me an embroidered pillow. So you’ve got a good heart. If you’ve got a

good heart, the rest comes naturally.”

“So you think you can give me a good social conscience?”

“I can give you a run for your money, Professor.”

“You think I’m worth the trouble?”

“I think you might be interesting.”

“Oh I can be very interesting.”

“So interest me, Mr. Oppenheimer of the Graduate Physics Department. Join the Party.

“You mean...?”

“Yes. I do. That is exactly what I mean. Do some harm, Robert. Now. For the greater good. Save your harmlessness for the workers’ paradise.”

“I believe Marx says the workers’ paradise is an ideal that is never actually achieved.”

“I believe harmlessness is too.”

She took his hand gently and then she firmly shook it as in job well done.

As she closed the door behind her he was thinking to himself, what if that pillow hadn’t been embroidered?

One night they found themselves on opposite ends of a couch at a party high on a hill in San Francisco, watching each other converse with their neighbors. It was late summer which was never as warm as it should be. They were only half talking about the War in Spain and the

despicable corruption of the waterfront racketeers. She watched him smoke the last of his cigarettes. He watched her smoke the last of hers, lit with a flourish by some guy whose name escaped them both. He liked that no one could tell his attention was fixed on her and hers on him. The quick glance, the brief grin, the mouthed syllable. The air was filled with conversation but also cigarette smoke, the sweeter smoke of pipe tobacco, the tang of a cigar somewhere or other and the scent of ladies' perfume. Louis Armstrong's Hot Seven was playing on the record player if you could only hear the man. The tall Victorian windows were thrust open to the damp air. Crickets thrummed. Breezes blew in. She stood up and gave him a look. He rose to meet her. Looking up into his eyes, she spoke so intimately he had to read her lips.

“Let's take the car up the coast.” She had a two-seater and she loved to drive by night.

“Where do you want to go?”

“I just want to go.”

“There's an old mission in Santa Cruz.”

She hiked up her skirt and stepped over the door to the driver's seat. Oh god her knees. They were perfect. They were cruelly perfect. How dare she have such knees. How do you go through life hiding those knees from the world? How do you go through life looking for those knees, knowing they are there beneath such skirts? There was a half-moon setting into the Pacific at midnight as they crossed the Golden Gate. As they neared the mission, a jackrabbit darted out onto Route One. She gasped and swerved to avoid it. Hands shaking, she pulled off the asphalt into the narrow strip of dirt that ran alongside the tall grass. A bobcat stared at them, his eyes all glass in the darkness.

“Oh my god, Oppie. Look at that beautiful thing.”

“He was probably after the jackrabbit.”

They held hands and sat in the silence of the empty road. The bobcat purred hypnotically, its sound so low it was also a growl.

“What were you saying to that woman in the green dress? She did not look pleased,” she said.

“We were talking about the dockworkers strike. She said ‘These men,’ like they were a personal affront to her, ‘these men sit around doing nothing all day, five of them doing the work of one.’ Like they were personally going to bankrupt the shipping companies. I said, ‘You’re worried about five guys making five dollars an hour? What about the owners who sit around all day mismanaging their companies, doing business in cash so they can avoid paying income tax, taking kickbacks, stiffing customers? Why don’t you point your finger at them?’”

“You sound like a communist, Mr. Oppenheimer.”

“Maybe I am. How does one tell if one is a communist?”

“Well. The telltale sign of a communist is often his girlfriend.”

“Oh then I am because my girlfriend is a Red.”

“How do you know this?”

“Because she takes me to parties for the Popular Front.”

“Ohhhh. I see. There are other telltale signs of a man with communist sympathies.”

“Such as?”

“He has read *Das Kapital*.”

I have read it cover to cover and I can tell you it is endless. It is as endless as the Russian steppes.”

“Ha! And he has read Lenin.”

“I read the *Collected Works* on the Twentieth Century Limited. Somewhere near South Bend I nearly heaved it out the window, but I didn’t. I finished it somewhere between Syracuse and Albany as I recall and then I offered it to the Ethical Culture School on Central Park West, but they already had a copy so I gave it to the Christian Science Reading Room which is just up the block.”

“And he gives money to causes like the Spanish Relief.”

“Who told you I give money to Spanish Relief?”

“You give them a thousand dollars a year.”

“Who told you this?”

“You did. Under duress.”

“I am always under duress when I’m with you. I think it’s your knees.”

“How so?”

“They torture me.”

“Would you like to see my knees?” She tugged on her skirt and rearranged herself in the driver’s seat. “You may touch them if you like.”

“Is this what they taught you at Vassar?”

“Do you know what Dorothy Parker says about Vassar girls? “If all the girls at Vassar were laid end to end, I wouldn’t be a bit surprised.” He blushed. “Oh look at you, Oppie. I’ve made you blush.”

“Who is this Dorothy Parker?”

“A well-known communist.” He laughed for the first time all day. “There I’ve made you laugh.”

He pulled a woolen blanket out of the boot and spread it over them. She put his hand on her knee. “Come on, let’s get this over with. They’re not magical. They’re just my knees.” He found he couldn’t look her in the eye. The bobcat went silent. The moon was gone beneath the sea, the stars slowly sinking with it. She took his hand and placed it all the way up between her thighs. “It gets very wet up there. There, now you know everything, lucky boy. Ok that’s enough of that.” She took his hand away and kissed him.”

“You really are a communist, aren’t you?” he said and she beamed.

“I have no use for the rules and regulations. I have no use for middle-class pretension and propriety. Am I shocking you?”

“Only a little.” But that was a lie. Everything about her was contrived to shock. To amaze. To dumbfound.

She infiltrated a hand into his crotch. “Oh look at you. Hard as a rock.” He pressed her hand tightly then moved it away because that’s what gentlemen do and he was apparently a gentleman although her hand made a powerful case to the contrary. “See now we are truly alive, Oppie. This is what it means to be alive. The stars, that bobcat, the cold air, sex. Maybe even love.”

“You’ve got me all confused,” he said at some point. He had no idea how long he’d been lost in thought.

“Good, that’s good. Abandon you head. That is not the way out.”

“Out of what?”

“Well, if you have to ask...”

“Oh I see. In the Bhagavad Gita, Krishna tells Arjuna we are not born and we do not die. So we’re already out.”

“That’s lovely, Oppie.” And then after a moment. “Who is this Krishna?” He laughed again. It struck him she was the only one who could make him laugh so quickly and so smartly. He could laugh with the boys but this was something deeper than they knew. “I said love, Oppie. Did you hear me?”

“You said, “Maybe even love.”

“So you heard me.”

“Yes.”

“And what is your response?”

“My response is somewhere between panic and joy.”

“That covers a lot of territory.”

“I know. I’m being cagey.”

“We sound like one of those movies with William Powell and Myrna Loy.”

“We should write this stuff down. We could make a lot of money in Hollywood.”

“Oppie.” she suddenly spoke fiercely. “There are things I care so passionately about I sometimes cannot keep polite company. Do you understand?”

He could only guess.

“Things I want to do and be and see and become, succeed at, fail at, win, lose!” She leapt out of the car with the blanket as her cape. She stood in the middle of the road and raised her arms to the sky. “I want more!” she shouted and she began to run. “I want more and more and more!” He stood up slowly not sure what he was seeing. He ran after her.

“Jean, Jean! Hang on!”

“You hang on. Hang on to me, Oppie!” Hang on for dear life.”

When he caught up with her, he could see some kind of barely contained glee in her wide-open eyes and a touch of something manic in her smile. She bristled with it. The bobcat snarled and hissed from the roadside grass.

“Uh oh, come on, slowly, Jean. Let’s get back to the car.”

“No,” she said, “I want to see him. I want to see his handsome face. Here kitty kitty kitty.”

“Jean, come on, back to the car.”

“Tell me the name of every star you know, Oppie. Do you know them all? Which one is that?”

“You can’t be serious,” he said.

“No, you’re right, I can’t!” She whooped and howled.

She was spinning out of control, he could feel it. She ran towards the sounds of the bobcat. The cat leapt out of the grass into the road. She shrieked. He grabbed her arm to place himself between Jean and the cat. The bobcat stood in the road glaring at them with his bright eyes. And then it sauntered off across the road.

“Oh what a magnificent wild thing. I want to be like that. That is my wish”

He stood there with her on high alert.

“I felt his soul. Did you feel it?”

“I only feel your soul,” he said. “That’s wild enough for me.”

They walked slowly back to the roadster arm in arm. He could feel her winding down.

“So we’re all made of protons and neutrons and electrons, are we?” she said out of nowhere. Everything good about her seemed to come out of nowhere.

“You’re not,” he said. “This is where the theory breaks down.”

“Where does it break down?” A bit coy, that.

“It all breaks down in the vicinity of you. You do not have a neutron in you.”

Oh she liked the way this was going. “What do I have in me?”

“You are made of Atman and Brahman.”

“Is that good?” She knew it was good.

“It is neither good nor bad. It is true.”

“You can be a very frustrating lover, Oppie.”

“Am I not doing it right?”

“You are doing just fine.”

“I thought I was.”

“You drive,” she said. “I’m exhausted. As he pulled carefully onto the road, he saw she was asleep.

A week later she threw a drink at someone, walked out of a meeting of the Spanish War Committee in some grimy little apartment and sat in her car and seethed. She would not speak. She drove him home in silence, dropped him off and sped away. A week later he met her in a café near Berkeley Square. He kissed her cheek and she recoiled but grabbed his sleeve in apology.

“I’m not myself,” she said. “Or maybe this is who I really am. Who knows? I wake up wondering who will I be today.” She could scarcely meet his gaze. Her eyes were lost to him in

darkness. They drank coffee in silence. When she spoke her voice was deadened, her essses hissed.

Finally he said, "Have you seen a doctor?"

"I do not need a diagnosis, Robert. It's nothing new." She lifted her eyes to his. It was a warning. "I just need you."

He saw her every few days in silence somewhere out of the way where they wouldn't run into anyone. They drove Route One in silences as long as the coastline. Every few days became a week. A week became ten days, two weeks. He wondered how this would end. Then one night she was back at the Peters' for cocktails. She was glowing. She flashed him a smile that nearly blinded him.

"I'm back," she said, "you see?"

"Jean," he said, "and kissed her nonchalantly. "How good to see you."

"I'm trouble, Oppie. Now you know."

Now he knew so many things, including the words to the *Internationale*, the politics of the dockworkers' strike, the history of the brutal prison system in San Francisco, the plight of the Republican sympathizers in revolutionary Spain.

Like Schrödinger's cat who was and was not dead, he was and was not a member of the Communist Party. He was like the celebrated cat in the shoebox, but he was hidden in a political box. Like the cat's biological life, his political life was held in abeyance by a political event that had and had not happened. For the cat, an atom of uranium sits next to the box. If it emits

radiation, a Geiger counter detects it, shatters a vial of poison in the box and the cat dies. If the Geiger counter does not detect radiation, the cat lives. But the radiation is only a statistical probability. So the atom emits and does not emit radiation. That cat is dead and not dead. Until someone opens the box and then the cat is alive or dead but no longer both. Similarly, for Robert, he was and was not a member of the Communist Party. While he was in his box, no one knew for sure; it was only a statistical probability. He had joined and not joined the Party. Communism was political poison and it was this heady brilliant truthful hopeful thing that Jean had introduced him to. The die was cast and not cast. Politically he was safely alive and at the same time most violently, publicly and shamefully dead. And like the cat he had no idea of his peril.

And like Schrodinger's cat he was and wasn't in love.

Chapter Eight

The Shot Across The Bow

Conventional wisdom has it that the truth is out there, immutable, eternal and men go out and find it and write it down in words. There is another line of thought that says truth is more accidental, more improvisational, that it could be written many different ways depending on accidents of cultural, political, military and yes even the personal history of the men who are

responsible for the result. So which is it, immutable or accidental? Maybe it's both. Maybe that's a bad question.

In '38 in his laboratory at the Kaiser Wilhelm Institute, Otto Hahn bombarded uranium with neutrons as Fermi had, only this time.... "Only this time." That was the story of Leo's life. This time two of Hahn's clever colleagues examined the results and determined that he had split the atom of uranium into barium and krypton and the three of them published the results in *Naturwissenschaften*. The idea which he claimed was ridiculous in '36 was no longer ridiculous in '39. Leo only wished he could have been there to wring Hahn's neck, not for the discovery itself, no not at all, he was entitled to his little triumphs, but because he so blithely broadcast it to the entire world and that included the *gottverdammte, gänsemarsch, sprechen sie Deutsch* Nazi Party.

Leo had just moved to America. When Niels Bohr arrived with news of the discovery Leo was sick in bed and missed the conference at the Washington Conference On Theoretical Physics where Bohr showed up with the stunning news. Word spread like the chain reaction that Szilard had been searching for, affecting every physicist who was exposed to Bohr, including Fermi, Edward Teller, Izzy Rabi, Eugene Wigner and several other Jewish refugees from Nazi Germany. They considered all kinds of ancillary details. They recorded many reservations. They made skeptical jokes. They put forward counter explanations. They proposed experiments to duplicate and otherwise confirm the results. They extensively checked and rechecked their calculations. They made suggestions for courses of corroboratory investigations they were duty-

bound to pursue. They asked pointed questions about the thinking of Germany's great physicists. But the bottom line was very clear: there was a bomb to be built.

When Leo felt better, he took the train to Princeton Junction and the Dinky to the Princeton campus where Eugene Wigner met him with the news.

“I tell you, Leo, they were all thinking bomb. Not a one of them was thinking, Oh! This opens up an entirely new field of research. What do you think, was it Hitler that made them think this way? Was it a coincidence that all this happened between the Sudetenland and the Blitzkrieg? It's rather uncanny is it not? As if the bomb knew when to make its entrance.”

Did you think it all happened by chance? Quantum fluctuations in the minds of men leading to thoughts, leading to designs, leading to heroic, triumphant construction? No. In the beginning was the word and the word was Bomb. We shall see who has agency here, who has free will and who is constrained by cause and effect.

Leo got a whiff of a Viennese melodrama as the first act approached its climax.

THE HOST

War is coming. I can feel it in my bones.

(There is a Knock on the door.)

A GUEST

I wonder who that could be at this hour.

(A stranger enters. We cannot see his face.)

STRANGER

Excuse me, ladies and gentlemen, for arriving unannounced. I'm the atom bomb. They say you are looking for me.

(All turn to regard the stranger.)

Slow Curtain.

End Act One

Leo only had one question for Wigner. How many neutrons came out of the reaction?
The answer was two maybe three. One went in but three came out. Meaning three more

uranium atoms would be split by the first. And then nine more by those three. And then twenty-seven more by those nine. A nuclear chain reaction of uranium. Then he asked a second question. How much energy is released by each atom of uranium when it is split? Enrico Fermi was in New York staying at the Warwick Hotel on Sixth Avenue. He didn't have to ask. He did a rough calculation in his head, and he went for a short walk in Central Park with his wife. He picked up a rock about the size of his hand and said to her, "A lump of uranium about as big as this rock would be enough to blow New York City off the face of the earth."

In Berkeley Oppenheimer needed about fifteen minutes at his blackboard to calculate precisely the amount of energy released by uranium in a chain reaction. But he wasn't thinking about New York. A few days later he had a sketch for a bomb on his blackboard. He was thinking about Nazi Germany.

In Rome he had bombarded everything in sight, every element in the periodic table. When Mussolini turned on the Jews, Fermi took his wife out of harm's way and emigrated at America. "We will have to learn English," she said. "Such a charmless language." He wasn't concerned. When he was sixteen, he had read a 17th-century treatise on physics. The treatise was complicated, the writing difficult, dense and hard to decipher. He hadn't understood till he had finished it that the book was written in Latin.

In his office on 120th Street, Leo Szilard presented his case. Szilard said he'd been chomping on the bit for four years. He had long since filed his patent for a nuclear chain reaction using neutron bombardment even though he had no idea which atomic element to bombard. "Bombard them all!" was his rallying cry, but Rutherford in Cambridge would have none of him and he had no resources of his own. The office was cluttered with boxes of broken electronic equipment awaiting triage and orphaned parts hoping for new homes.

"I brought you *cannolis* from a bakery on Sullivan Street in Little Italy."

"Leo, I like you already."

"I promise you it was not easy. The baker spoke no English and I have very little Italian."

The fellow knew how to break the ice. He liked Szilard immediately. Maybe not so much for his mathematical skills or his ability to think in terms of experimentation, but Szilard could see things. He had escaped Hungary during its anti-Semitic rage after the Great War. He had seen the value of the neutron before anyone else. He had seen the danger for Jews in Germany. He had seen how Hitler would re-arm. He had predicted the annexation of Austria. His was a rare faculty; he saw how the world works and he knew how to act on that knowledge. He had rich friends and he knew how to ask for favors.

"Enrico, I am desperate. I have spent the entire decade of the '30's thinking about the neutron. I sometimes think I have become a neutron. I have bombarded the scientific establishment with my ideas but I get no nuclear reaction. My list of rejections sometimes unnerves me, but I plod on. While I have been begging the Crown Head of Europe for an

audience you have been bombarding every element in the periodic table. In '34 your yourself split the uranium atom but you didn't know it."

"I am profoundly embarrassed by this. But really, is it so important?" Fermi really didn't like to discuss it.

"Look at these results, Enrico. Hanh has split the uranium atom and Meitner has confirmed it. And Bohr has given us a theoretical framework to make sense of it. And now everyone and his uncle is splitting atoms and thinking about the chain reaction. The bomb now has a life of its own."

"The conservative thing is to assume this bomb is not a realistic thing. What are the odds, ten percent likelihood?"

"No, Enrico! The conservative thing is to assume this bomb is real and we must have it first! The odds are ten percent that we are all dead."

"Leo, what you say is interesting up to a point. The theoretical aspect of the chain reaction fascinates me but we would need a gram of radium. Do you have \$50,000 you can spare to buy it?"

"No but I have a very rich friend here in New York who will lend me the money to rent a gram of radium for three months."

Enrico felt the world come into focus. "And we need uranium. Have you got some?"

"I can borrow uranium oxide."

"Are you for real?"

“Four years ago, I patented a procedure for a neutron chain reaction and I gave it to the British Admiralty with the proviso they keep it secret. So yes, I am very much for real.”

“Leo, this an excellent *cannoli*. Welcome to Pupin Hall. Let me show you my laboratory. It is five stories underground. I think we are going to do great things down there.” Then he added, “I hope this bomb of yours is not one of them.”

“Enrico, if we set off a nuclear explosion in your lab, do you think five floors down will be far enough to save Manhattan?”

“No I suppose not. But really Leo, a nuclear explosion? That is thirty years away. Fifty years away. Let’s just do our work. We have a lot to do and a lot to learn.”

Leo soaked in his bathtub in his rooms in the Knickerbocker Hotels and pondered the state of his affairs and the affairs of the world. He was now Jean-Paul Marat in his Paris tub infected with a deadly bacterium that required his constant immersion in warm water to keep his fever at bay. In near despair he feared the dire entrance of Charlotte Corday with her long knife, spurned lover, unbalanced by jealousy and a desire for revenge, who would find him unarmed, unclothed, immobilized by his fever and dispatch him before he could save mankind from its warlike self. He and Walter Zinn had cooked up an ingenious experiment to detect the number of neutrons generated by uranium fission, but they had to wait till March to get their hands on two grams of radium from the Radium Chemical Company before they could proceed. And so he sat and soaked and planned.

Beautiful Zinn had built an ionization chamber which Leo coveted beyond all things. With Leo’s radium and Zinn’s ionization chamber they finagled their way into Pupin Hall to set

up their experiment. Leo's latest financier Benjamin Liebowitz had bankrolled the work. Liebowitz believed in Leo. He put his money where Leo's mouth was. Leo would intercede on his behalf with God if he could. They fashioned the experiment so that neutrons flashing through the ionization chamber would light up an oscilloscope attached to a television tube. For Leo who normally disdained the Geppetto-in-his-workshop aspect of nuclear physics, this was a labor of love. Finally, they had sat and watched and counted and calculated. Clearly two neutrons came out for each neutron in. Clearly. They watched and counted and confirmed it again. Then they shut it down and each went home.

In the bathtub Leo burned with fever.

Goddammit goddammit I knew it I knew it. Goddammit. Now what? Now what do we do? Dear God in heaven, Ruler of the Universe who created the fruit of the vine, what were you thinking?!?! What have you given us? What have you done to us? This is how you repay our devotion? Leo had waited and hoped and feared this moment since that day of his epiphany in '32 in Piccadilly Circus. As he soaked and simmered, it occurred to him that yes God had fulfilled his part of the bargain. He had protected his People. He had given them a weapon to wield against their enemies, this atomic jawbone of an ass and Leo would have to be their radioactive Samson who ventured out to do battle with the Philistines and their pagan fish-God Dagon.

The thing he dreaded and needed had come to pass. He picked up the phone and called Edward Teller in Ithaca, New York. He had to tell him. He knew Teller hungered like he did to safeguard the world from Nazi Germany with the help of the neutron. But there was something

about Teller you couldn't put a finger on. Ambition? Single-mindedness, freedom from empathy and humility, from constraint? "I have found the neutrons," he said and hung up.

Deep in the darkest caverns of the slumbering earth a dragon awakened.

Did someone say my name? Enter Iago, Spanish for Jacob, patriarch of the twelve tribes? No I have not fathered twelve tribes, but I am a patriarch of a kind. I fathered the age, the Atomic Age. Others may take credit. They were but midwives, doulas. Not fathers. And certainly not The Father. But do you not also hear in that name Iago an echo of Freud's "ego"? I think you do. We now know of course that Shakespeare read Freud, by which I simply mean that when we read Shakespeare today, we read him with an ear to Freud and all the other great writers who followed Shakespeare, but in this case, mostly Freud. Well yes, I am an ego or I have an ego. Why should I not? Would it not be a kind of unilateral disarmament in the science wars to silence my ego when I speak my name? Science proceeds by force of logic but equally by force of personality, through drive and determination, the willingness to put your head on the intellectual block when others decline to risk their professional lives. So yes E(a)GO. I'm ok with that. Do you think perhaps you also hear the word "id," primitive, animal, unconscious, instinctual, rampaging, aggressive, chaotic "id" in my name? Many do, but that is an unfounded attack on my reputation. I have come to expect that. I am a target for the revanchists, the revisionists, the rewriters of history. History, they say, is written by the winners, carved into tall

standing stones by Pharaohs and emperors and sunk into the dry grounds of their borderlands to intimidate their enemies and enforce their dominions. But then, you see, history is excavated, translated, interpreted, expatriated and exhibited by its captors in later ages. A lot goes missing when history finally arrives in their museums and libraries, and a lot is added. History is at the mercy of time. Ironic that. But I am vigilant. I fight to protect my legacy. And while we are analyzing the subtext of my name, why not “super-ego”? Super, with its undertones of superior, superlative, and The Super. That was my baby, my project, my weapon of choice, a thousand times more powerful than the A-bomb of Hiroshima, The Super, a bomb that might rule the world if we had the strength of mind and the courage to do what must be done for the sake of freedom and civilization, the real bomb, the hydrogen bomb, the one that comes not from the ores of the earth but from the sun in the sky.

And thus ends my catechism.

For now.

Like my literary brother, Edmund Gloucester, I deliver my soliloquy and I exit to bide my time, to fashion my plans. To entrap my victim. To take his fortune and make it mine. Now Gods, stand up for Edward Teller.

Teller is indispensable. If he hadn't existed it would have been necessary to invent him.

Szilard And Teller took the train from Princeton to meet him in his hotel room in DC. He had been to meet with Admiral Cooper at the Navy Department to inform him of developments in physics that related to the war effort. “There’s a wop outside,” he heard somebody say. Not, “Enrico Fermi, the great Italian physicist who won the Nobel Prize,” no, “a wop.” In a barren conference room, he described his experiments and Szilard’s experiments and what they might mean, the expenses involved, the rarity of uranium, the difficulty of manufacturing the necessary amount of uranium isotope 235.

A chipper junior officer interrupted. “How much uranium are we talking about here? Enough to make a .45 caliber bullet?”

He sighed, at the telling, but also at the hearing of the question. “No one knows at present.” He probably thought such questions are provocative and might stimulate the Navy to get to work. It now seemed more likely that the Navy liked answers in black and white, in round numbers without decimal points or exponents. “You might need enough to power a small sun,” he replied.

Szilard was livid. “Who is the greater fool, Rico, you or the Navy? I do not know.” Szilard had his feet up on the sofa as if he were in the bath. He swung them around and put his feet on the floor not so much for emphasis but because you don’t argue with a man when you’re flat on your back.

“Enrico, you do not joke about such things,” said dark, mysterious, hidden Teller.

“I wasn’t joking,” he said.

“You were being ironic,” Leo almost shouted. “Which is worse!”

“They called me a wop, the sons of bitches.”

“We have more important matters to discuss. Rico, I beg of you, I demand of you, you cannot publish your results.”

“He’s right,” said Teller. “Leo will refrain. I will refrain. You must refrain.”

“I have my name to project, my discoveries,” he grouched.

“So you send in your paper to Physical Review, they say ‘*Si, si, Enrico. Bravo, bravissimo, Enrico.*’ ‘*Grazi, signori, sei troppe gentile!*’ you reply. You have established your intellectual priority to all your discoveries. ‘We will publish this at once, *pronto!*’ they tell you. ‘*No, per favore, not so pronto. We must wait,*’ you say. And you explain to them. The GODDAMN GERMANS read their magazine. Do they want the GODDAMN GERMANS to know about this research so they can go build themselves *eine atombombe?*”

“He’s right,” said Teller, grave, succinct. “We ask them to wait.”

“Wait for what?”

“Wait till they are a pile of Nazi cinders on the ash heap of history, Rico,” said Teller with quiet intensity.

“There will not be a bomb, Edward. I am with Bohr on this.”

“When we know for certain, for deadly certain, there can be no bomb, then you may publish to your heart’s desire,” said Leo.

He took a call on the hotel phone long distance from New York. It was Herbert Anderson. “Joliot-Curie has published her results in *Nature*. The March 18 edition.”

There was silence in the room.

“Now the whole world knows,” said Leo, incredulous. “What is wrong with that woman?”

“I will wring her little French neck,” said Teller.

“So we may as well publish,” he said. “The cat is out of the bag.”

“I am going home,” said Leo. “I am getting into the bath. I am not coming out.”

“You said it was urgent, Leo. I find nothing in my life is very urgent these days.” He wore an old cardigan in spite of the summer heat.

“Forgive me, Herr Professor, I have a great favor to ask of you.” Einstein’s white clapboard house on Mercer Street was charming in its pristine modesty. His secretary brought two strong cups of French coffee to the front porch where they sat. Szilard could make small talk with the best. It helped that Szilard had been his student and that they had a history. “You

have a beautiful home in a lovely quiet neighborhood, but I observe that the Americans do not understand the need for brick and stone to build one's house. Possibly because they have not suffered invasion and the ravages of musket shot and cannonball in their brief history, nor do they understand the deep reach of history from its precipice where they sit." A lovely piece of small talk that.

"You know," he replied, "they fought a battle in their Revolutionary War right along this road. General George Washington was here."

"I have heard the name."

"And a British general whose name I cannot recall. They tell me the two armies marched along parallel roads half a mile apart and did not know the other was near. Then they marched headlong into each other in a field on Mercer Street."

"And who won the battle, Professor?"

"Perhaps you have not heard, but Washington's fame lies in the fact he lost every battle but won the war."

"Ah, Professor. The man must have been a genius."

"Like a Russian General, Leo, he never attacked without overwhelming advantage. And he never had an overwhelming advantage."

He still had that twinkle in his eye. It was becoming a Law of Nature. It was going well. He pressed on. "How is your work going, Professor?"

“Oh Leo. Ask me something else. I sit here and the ideas do not come. I am like an old packhorse from the War. Mud is everywhere. My way is choked with stragglers, but I plod on. I only hope I do not get stuck in the mud and go mad.”

“Professor.” Leo took the leap. “There is something you and I can accomplish together. That is why I am here.”

“Is this some political cause you have come to promote? Are you raising money? Really, Leo, you must know I field such calls on an ever-growing basis. It is enough to try my patience.”

“Nein, Herr Professor, nein.”

“Oh, I am relieved. You wish to help me with my unified field theory?”

“Me, Professor?”

“As a rule, I let no one come near my equations, but I might make an exception for you.”

“I am honored you think of me.”

“You were an excellent student. Perhaps I could bring you up to date, but it would take an enormous effort on your part. I still have hopes to dazzle them again and strike a mortal blow to their quantum nonsense in the bargain.”

“Professor.” Leo leaned forward with a look of urgency about him. “You are aware, are you not, of the recent advancements in the splitting of the atom?”

“No, Leo, I find I am far away from all that. It only muddies my thinking.”

“Otto Hahn has split the uranium atom with a neutron.”

“Split it? What does this mean, ‘split it’?”

“It means he has reduced it to barium and krypton.”

“This is fascinating, I suppose, if you like to play with atoms.”

“And 200 million electron volts of energy.”

“Oh, I see.”

“And two or three neutrons are given off in the process.”

“Leo, this is of little or no interest to me.”

“Which means you have a chain reaction. Each split atom leads to two more split atoms.”

“Oh.”

“Yes.”

“Oh I see.”

“Do you?”

“You are talking about a bomb, Leo, are you not?”

“Fermi and I have reproduced Hahn’s experiment and we have done some calculations that show ---”

“Please, Leo. Enough.”

“A pound of uranium releases a stunning amount of energy.”

He held up a hand. Leo, he thought. Young man. So ambitious, so clever, so dangerous you are. “You wish to discuss a certain application for this release of energy, some engineering marvel, or perhaps some further hypothesis concerning the weak force?” But he knew it was not so.

“I wish to discuss the bomb. In my work with Fermi at Columbia it has become clear ---”

He came to his feet. “No. No. There is nothing to discuss. It is an abomination.”

“It may be an abomination, but it must be *our* abomination.”

“No, Leo, no. This line of work must be *verboten*.”

“You cannot forbid the inevitable.”

“Why is it inevitable?”

“Allow me with all due respect to recount the facts. Meitner and Frisch discovered fission in Stockholm in January. Within weeks Fermi and I repeated the result at Columbia. A few days later some fellow did it at Carnegie. Every boy in his basement will be splitting uranium atoms. Including the Hitler Youth.”

“I am a man of peace, Leo. I devote my life to celibacy and now at the site of a whore you want me to climb into her bed!”

“This is legitimate and necessary scientific inquiry.”

“I am ashamed of you all.”

“Professor, you cannot put the genie back in the bottle.”

His voice rising with indignation, he spat out the words, “But you do not have to hand him to the United States Army on a silver platter.

“And what do you imagine Heisenberg and Hahn are doing for *die Wehrmacht und die Luftwaffe?*”

“I imagine they are selling their souls to the very devil so they can continue their precious research. Do you wish to do the same? Do you wish to burn in hell for all eternity?”

“I fear we will burn here on earth.”

He sat slowly. He took some time to let his temper settle. As his anger came to rest he saw the scientific battlefield stretch out before him. He saw the armies lined along their wet rat-infested trenches mustering for battle grim and anxious, their mudsoaked uniforms, the flashing of their polished bayonets, the brisk snap of their flags in the wind, the inhuman grin of their gas masks, and he saw it was a battle to the last man and it could not be stopped, as if it were a battle without generals, corporals and aides-de-camp, a battle of massed, unthinking, blood-thirsty hordes who could only attack and die. He saw it with the intuitive force of certainty, like a Pythagorean truth, only this truth was in his heart. It sickened his soul but there it was stretched across Europe from Passchendaele to Verdun. “Leo, *mein gott*, I did not foresee this. What are we to do?” He put his chin into his chest to keep from losing emotional control. That would not be helpful.

“We do what we must, Herr Professor.”

“No, Leo, please, I do not wish to be a part of this. You ask me to destroy my honor with this bomb.”

”Herr Professor, I have written a draft of a letter to Roosevelt.”

“Leo, give me a moment. I do not care to be rushed to my doom. It is not seemly.”

“Forgive me, Herr Professor. These are grave matters in grave times.”

“Ask God to forgive you, not me.”

“I have asked God to forgive me. I have not heard back from Him.”

“No, I don’t suppose you have. All right, then, let me see this letter you have written.”

Leo took the letter out of an envelope he carried in the breast pocket of his suitcoat and handed it to him. He read quickly, half aloud. He put the letter down on the coffee table. “In my name? You have taken the liberty of writing this letter in my name? You are a very presumptuous young man to think I would write, let alone endorse, such an evil thing.”

“You must understand, Roosevelt will not read a letter from me. He would not take the advice of a physicist.”

“And what am I?”

“You are a man of science, you are a world leader, you are a man of peace.”

“Not any more would I be a man of peace with my signature on such a document.”

“I will trouble you no further. I will leave it to your conscience.”

Godverdamnt, Leo! You have no right to speak to me like this. ‘For they have sown the wind, and they shall reap the whirlwind.’ ‘But I will send a fire upon his cities, and it shall devour the palaces thereof.’ How odd that he still remembered Hosea.

“Herr Professor.” The sadness in Leo’s face struck him full on. “Perhaps God will send a fire, perhaps not, but Hitler will surely send one. Mark my words. And he will show no mercy. As he has made very clear with our people.”

At the sound of raised voices, his secretary appeared at the door. “Helen,” he said, “another cup of coffee for each of us, *bitte*.”

They sat in deep silence and watched the big cars drive up and down Mercer Street.

“When I wrote down the equation for general relativity, I thought now I am hearing God’s voice. I am like Isaiah, I am his prophet. But a different kind of prophet. I do not shame mad kings who worship false idols or tell them how to rule their people. I speak to men of science and I describe to them His design for nature.”

“Herr, Professor, Isaiah spoke because God put a hot coal in his mouth. Has He not done the same for you?”

He looked at Leo, perspiring in the summer heat. He saw the desperation in his tight smile. Like a rabbi peering into the unscrolled Torah with his *yad*, he considered Leo’s metaphor.

“Leo, this letter is too long. Let me see what I can do with this. We must come up with something even Roosevelt can understand.”

“Danke schoen, Herr Professor.”

“You are a brave man, Leo. You have the courage of your convictions. That is a rarity.”

“It is not courage. It is common sense.”

“I must trust you, Leo. You have been right about Hitler all along. I will work on this.”

He looked at the letter on the coffee table and thought that they probably wouldn't even read it, And even if they did, they would never understand it.

Now there was a war room in Leo's head, cavernous, underground, inadequately ventilated, harshly lit, its whereabouts a closely guarded secret, always manned, always buzzing, always evaluating the ongoing war for nuclear weaponry. Its walls were covered in maps of the evolving battle for the uranium atom. Reports arrived by messenger. Announcements played over loudspeakers. Captains huddled in corners to examine field reports. Lieutenants scanned and summarized publications for any hint of new developments. Weary privates updated the troop movements of information, war *materiel* and contraband on enormous tables representing best guesses at the battlefield terrain. Train movements were monitored for news of the *Wehrmacht*, the *Luftwaffe*, the Kaiser Wilhelm Institute, Werner Heisenberg. The scent of fear and overwork was in the air. By means of this heroic effort, the war was modeled in its brutal complexity. In the darkness of a hidden office, soundproofed and heavily guarded, Leo Szilard maintained an iron grip on the ever-changing situation, Generalissimo of the nuclear pile, Field marshal of the chain reaction, Quartermaster of the uranium purification, Major General of

plutonium production, Chancellor of quantum theory, Prime Minister of nuclear fission, *Der Führer* of the atom bomb.

At Berkeley Oppenheimer perfected the practice of growing physicists from intense and awkward youths. They blossomed, bloomed and leafed in the hothouse of his pedagogy. By the time the war broke out in Europe he had the best school for nuclear physics in the country. He wasn't going to say it out loud, but he really loved his guys. He loved to watch how their minds awoke to the beauty of quantum physics. Morrison for instance. He was standing in front of the class near the end of the term, chalk in hand, blackboard covered in the white-hot flame of his current thinking. But it wasn't the formulae on the blackboard that interested him; it was what the calculations on the blackboard *meant*. Where do calculations acquire meaning? In the mind of the physicist who sees beyond the numbers to their interpretation, to a picture of the world. At the beginning of the term it was Morrison's habit to copy down everything he saw on the blackboard, to scrounge every equation. He was worried about Morrison, whipsmart but nearsighted. Then less and less. Morrison's hands went from desktop scribbling to immobility in his pockets. He sat with them thrust deep in his woolen pants. He grew stiller and stiller and his hands went deeper and deeper. And one day he was sitting there in the back of the classroom going, "Oh my god. Oh my god. Oh my god."

"Did I say something good, Mr. Morrison?"

“Oh my god!” He grabbed his desk to express his wonder. “I can’t even speak.”

“But you must! Tell us what is this epiphany, Philip. We are all ears.”

“All this time, I *thought*...”

“Yes you thought...”

“Yes I thought, but I did not SEE!”

“And what do you see that once you only thought?”

“It’s. A profound. Mathematical. Tension. A balance.”

“Yes...?”

“Of forces. It can be described mathematically, but the math...”

“Yes, the math...? Finish the thought, Morrison.”

“The math is like the words in the script. ‘To be or not to be.’ ‘Tomorrow and tomorrow and tomorrow.’ It’s very pretty, but then the actor gets up and speaks the words in the play and you are dumbfounded at the beauty of it all.”

His heart leapt. The chalk stopped jiggling in his hand. A mathematician had become a physicist. Morrison was never the same after that. It was no longer about the math for him. It was the theory, the picture, about nature, the brilliant aha moment as opposed to the solve the complicated equation moment. He wanted that eureka moment back. He had tasted it and he loved the taste. He began to talk theory from the back of the classroom and then from the front of the classroom where he could see the look in the Master’s eye. Morrison was like a faucet

that had been stuck. He had gripped and yanked the handle to get it to budge and now it had come unstuck and was wide open. He loved to see this kid Morrison's mind awaken. You could see it in his eyes how he was listening for the big ideas and dreaming God's dream of an orderly universe.

He had been teaching them the nuclear fusion of the sun. They say you teach what you need to learn. Beautiful Hans Bethe had peered into the fiery furnace and seen not Meshach Shadrach and Abednego, but fusion, the nuclear process that caused the stars to burn. Hans delivered a paper at a conference at George Washington University on his breakthrough work in fusion. Every man on the planet who could understand his paper was in the room. The room was not large but it was mostly empty. The sheer cussed beauty of his equations was enough to drive a physicist mad with desire but the fact that they described the sun was difficult to comprehend.

Hans and he walked out of the conference hall into the mild winter afternoon. The cherry trees were not yet budding.

"It's stunningly good, Hans."

"Are you a little bit envious?"

"I am secretly quite envious. I don't know how you do it."

"I don't have your appetite for the grand gesture. I do it one equation at a time. I don't design pyramids. I lay bricks. Eventually it comes to the same thing."

"I want to read everything I can get my hands on regarding stellar fusion."

“There is only me, Oppie. Let me steer you in the right direction. Then you are on your own.”

“Thank you, Hans.”

Hans Bethe opened his eyes.

When a star burned out, it collapsed. The question was how far did it collapse? Einstein had published a paper from Princeton in which he claimed that his general theory of relativity proved that a star could not collapse into an object so dense that no light could escape its gravitational pull. Oppenheimer suspected that Einstein had got it wrong, that he could prove the exact opposite from the very same principles of Einstein’s theory of gravity. And he liked that he suspected it in spite of Einstein, that he was not intimidated by the great man, that he was instead provoked. He was deeply attracted to this idea of a sun going cold, when it no longer generates heat or light, when it dies and goes silent. It had an archetypal quality to it. Carl Jung would undoubtedly have something to say about it.

Chadwick had discovered the neutron in ‘32. Zwicky and Baade had proposed the existence of the neutron star in ‘34. If a star were big enough, it would explode into a supernova, then it would collapse into an impossibly small dense object. The protons and electrons of every atom would fuse, each proton fusing with an electron to create a neutron, hence the neutron star. A spoonful would weigh a billion tons. Its gravity would be so enormous only an object moving at half the speed of light could escape from its surface. Robert liked that idea. It was exotic, provocative, beautiful. Einstein had disliked it intensely. He thought it was ugly. He thought he had disproved it. But not so fast, Professor.

Somewhere in the galaxy a star was collapsing at this very moment. This was a subject worthy of meditation. When God created the heavens and filled them with hydrogen in the aftermath of the big bang, did He foresee that this hydrogen would condense into giant spheres of gas and that they would ignite through nuclear fusion creating helium and eventually carbon? Did He think it all through to its natural conclusion? That carbon and hydrogen would evolve into life, that life would evolve into intelligence, that this intelligence would look upon his Creation and find it wondrous, warm and benign but also miserable, cold, forbidding and inhospitable? That He had created death when he created life?

It was also a subject worthy of science. He investigated the gravity of stars and how they collapsed, whether there was a force that countered the force of gravity. If the star were big enough, would it collapse all the way into nothingness? That was a provocative thought, an object whose light cannot escape it, an object which is hidden from the world by its own enormity, its own density, so bright its light, so black its darkness. As bright as its light had been, that was how black its darkness would become. Was that fate? Karma? Penance? Stop. That's not science. That's something else. While the rest of the scientific community went about their investigation of the atom, he was thinking about the stars. He produced a beautiful paper with the rather sci-fi title "*On Massive Neutron Cores.*" If the star were massive enough it would continue to collapse beyond the state of a neutron star. It might collapse into the nothingness Einstein rejected. How long would this take? It would take forever. As its gravity approached infinite density, time would come to a halt for this dying star. It would die an infinitely slow death. He wondered if that would be a good thing or a bad thing.

He saw her one last time that final summer of the phony peace that preceded the agonizingly phony war. She drove up in a car he didn't recognize and came to the door with a small box in her arms.

“Are you Pandora?” he said. “And do you bring me hope?”

“No I bring you back the useless trinkets you spent your money on. I do not like your bourgeois displays of wealth. Which I have told you a thousand times.”

“Ah, not Pandora then. Diana the Huntress. Forgive me if I slam the door and run like hell,” he said, but he held his ground. There was a mortal look in her eye. She bristled with that crazy energy that mesmerized and terrified him depending on the day, the hour, the minute.

“Oh, Oppie.”

“Oh, Oppie, what?”

“I wanted to do this nicely.”

“No you didn't.”

“Goddammit. Yes I did.”

She wanted to cause as much pain as she could just as she wanted to bring as much joy as she could.

“Oh well then, come in. Have a cup of coffee. We can reminisce about old times.”

“That’s not what I meant.”

“Well what did you mean? I don’t seem to be understanding you today.”

“You have never understood me, have you? You only knew who you wanted to understand. But that’s bad, science, Oppie. You look to confirm what you think you know and not to find out the truth.”

“Ok. So save me the trouble.”

She thrust the box at him which he took casually and opened.

“No, don’t open it!”

He took out a bracelet.

“Fine, I’m leaving.”

“Was this from the first time I asked you to marry me or the second?”

“I’m not going to do this.”

He took an old leather-bound book out of the box. “So that’s where this went. That was not a present.”

“I didn’t say it was.”

“Did you ever read it?”

“I memorized it. ‘There is a spectre haunting Europe. The spectre of communism.’”

“Go on.”

“All the powers of old Europe have entered into a holy alliance to exorcise this spectre: Pope and Tsar, Metternich and Guizot, French Radicals and German police-spies.”

“You pass.”

“No, you pass. You pass for a communist but you are not a communist. Everyone who is not a communist thinks you are. Everyone who is thinks you’re not. You have it both ways. It’s dishonest. It’s despicable.”

“And you pass for a woman who knows how to love when in fact you are much better at hurting.”

“Screw you, Oppenheimer.”

“And by the way whose car is that?”

“Nice, hunh. Big enough to have sex in. I mean real sex.”

“Jesus, lady.” He felt that in a place that could not be reached.

“We go down to Big Sur.”

“Who’s we?”

“Whoever.” He was looking at her, but his attention was on the pain.

“Oh it’s your car.” It was getting too intense, too strenuous to keep this up. He could not give as good as he got. He might explode with incandescent rage but he would collapse into frigid silence.

“God I’m sick of this,” he said. “Go and good riddance.” It was all profound sadness and loss. He recognized that old friend.

“Show me some goddamn anger, Robert. You are the mildest meekest man I have ever had the misfortune to love.”

“Harmlessness, Jean. *Ahimsa* as Krishan says.”

“Good for you, Robert. Your kiss is *ahimsa*. Your words are *ahimsa*. Your cock is *ahimsa*. You shall pass from this world.”

Chapter Nine

The Reactor

Leo was so frustrated he could spit, as they liked to say in New York. In fact, he was hopping mad, as they liked to say in London. Never mind what they said in Budapest. THERE WAS NO WORK BEING DONE. ANYWHERE!!! The whole world was on summer vacation. Fermi took himself up to Michigan, wherever that was, to teach a summer term in theoretical physics. What was wrong with the man? Szilard was only a guest lecturer at Columbia. He had no pull. He couldn’t requisition a cup of coffee for the lab at Pupin Hall and there was so much work to do. In the Oak Room at the Plaza Hotel he spoke to Lord Rothschild

about funding. The man was in a double-breasted suit and braided leather suspenders. His martini glass was almost empty when Leo entered.

“Lord Rothschild, my profound apologies. My life is a comic opera.”

“Do sit down, Mr. Szilard.” Leo sat in a wicker chair whose wood frame had been varnished within an inch of its life.

“I took a subway to the Eldorado Radium Corporation to retrieve a gram of uranium. I had no idea it would be encased in a box of lead weighing 100 pounds. You have to imagine me lugging it to the curb to hail a taxi. And then up six flights of stairs to my office.” It was a good story, but it wasn’t quite true. Herbert Anderson had done the lugging a few months before. Leo couldn’t resist the anecdote, especially with himself as the unlikely subject.

“Martini, Mr. Szilard?” Lord Rothschild looked skeptically into the distance and raised a weary hand as if one were not sure waiters were making themselves available at the moment.

“Very dry with an onion.” A waiter approached with a mannerly disregard.

“Waiter?” His relief was clear. “Martini dry with an onion for the gentleman.”

“Yes sir.” The waiter rustled like money.

“Tell them to wave the bottle of vermouth in the general vicinity of the glass. That should be sufficient,” he said. Lord Rothschild smiled. Good. They laugh at your jokes but they think you are a lightweight. Eventually they got down to business.

“Tell your syndicate that I have a patent on nuclear power. We can build factories that run on my patented notion of a neutron-induced chain reaction. We can build power plants in Africa. We can electrify the entire continent.”

“And when can I see a practical demonstration of this power?” Rothschild seemed to be considering the fabric of Leo’s suit.

“That would be the purpose of your initial investment, sir. To devise such a demonstration.”

“And how soon after such an investment may we expect a result?”

“That I cannot say. Perhaps before the end of the year, if Hitler does not drag us into war.”

“Hitler would not be so foolish, Mr. Szilard.” Rothschild picked up his glass by the stem and considered draining it.

Rothschild did not know he was revealing his hand. It always surprised Leo when rich men revealed their lack of understanding. Here was a man who had inherited his fortune. How soon it would be gone with such a limited view of the world.

“You, sir, provide the financing. I will provide the scientific know-how. Naturally I retain majority interest in the project.”

“I do not think my friends will go for that, Mr. Szilard. We are a persecuted minority in all phases of life except finance. In finance we have the majority interest or we have no interest at all.” He was trying to sound off the cuff but it was clear he was reading from a script.

“Science must rule this endeavor, not finance.”

“When in the history of the world, Mr. Szilard, has that ever happened?” Rothschild examined the flower in his lapel as if to say his mind now wandered.

“Lord Rothschild, I will consider your offer, but I fear events may overtake us.” Leo was discouraged but so what. Life was discouragement. And perseverance.

Lord Rothschild signaled ambiguously for a waiter. He did not wish to appear to be in any hurry. “I am struck, as always,” he said, “by your deep understanding of the world at large, M. Szilard, and your naivete concerning all things financial. I am not your fairy godmother. I am a banker. They are not the same thing.”

Leo considered the possibility they were in fact one and the same thing if you spoke their fairy language, but evidently he did not.

Chicago Pile-1 reminds me of a Mesopotamian ziggurat rising out of the hot sands of the alluvial plain, but it is winter in Chicago, the winter of '42. The Pile has nearly as many priests as the ziggurats of Ur and Uruk had five thousand years earlier. It is equally mysterious and it controls the destiny of its nation with an equal amount of fear and violence. Like the priests in the temple district of Ur pouring over the animal sacrifices performed in the temple looking for propitious signs, the priesthood of Chicago Pile-1 pour over the results of their atomic altar for signs of success or failure, or as they call it in their holy language, “criticality.” Some things do not change. I take no particular credit for this. It is part of the logic of humanity, which is so

deeply embedded in creation, playing itself out over and over again. I will say this. It pleases me no end to see them reach out to their gods with such strenuous, desperate sincerity. No shame in that.

Szilard, Fermi and Herbert Anderson were exhausted. They were convened for the umpteenth millionth time in Fermi's office in the turret of the Metallurgical Lab, the Met Lab, on the grounds of Stagg Field. The whole operation had emigrated from New York, whose harbor could so easily be shelled by Herr Hitler's *unterseebooten*, to the South Side of Chicago. It must have been near midnight, but no one had the heart to check.

"They were called the Maroons, the football team," said Herbert.

"Football, yes, but where are the goalies?" Leo asked. He was slouched in one end of the cavernous sofa whose arm was speckled with coffee stains in a suspiciously random pattern. Everything looked suspicious to Leo now.

"Not goalies, goalposts," Herbert replied. "Different game entirely."

"Why are we talking about football?" Fermi asked with quiet fury.

"I want to see this football game with the goalposts," said Leo. "Enrico, it is so American. They play football without their hands."

“They don’t play it here anymore,” said Anderson.

“Probably that is a good thing,” said Leo. “We might blow them all up.”

“They were very good. Fifty thousand people came to these games.”

“Where do they play it now?”

“The Chicago Bears play at Soldier Field. You can hear the game from here on Sunday afternoons.”

“It is like a dull roar, yes?”

“Yes.”

“I thought it was coming from the Lake.”

“They have an excellent team. The quarterback is Jewish.”

“A Jewish man plays football?”

“Sid Luckman is his name.”

“Both of you get out. I need some peace and quiet,” said Fermi.

“I have a brilliant idea, Enrico. I just need five minutes to close my eyes so that I may recover the faculty of intelligent speech.”

“When did he ever have this faculty?” Fermi asked Herbert, who was on the floor with his legs up on the couch in order to rest his aching back. He was covered in black dust like Fermi. There was no dust on Leo. His hands did not experiment. Only his mind.

“I have to consider the possibility that I am having a nervous breakdown. A voice is shrieking in my head day and night. I cannot make it stop,” said Leo. He was more or less talking to himself in such a way that he might be overheard if anyone were interested.

“Possibly you need to see a headshrinker, Leo,” said Fermi. His sense of humor was so subtle it often passed for sympathy.

“You realize that while I am lying here in a coma, I could be on the phone with Sachs discussing the budget from the National Defense Research Committee. I could be negotiating with the man from the National Carbon for a less ridiculous price for pure graphite. I could be finding another source for radium-beryllium. I could be meeting with that refrigeration engineer from International Business Machine. I could be doing the calculations for rectangular pile versus a spherical pile versus a dodecahedron pile.”

“We don’t need refrigeration. Are you out of your mind?”

“We will in two or three years. I AM JUST THINKING OUT LOUD, ENRICO! *Scuzi*. This is what I mean. I am not a well man.”

“No malingering, Leo. You’re in the Army now,” said Herbert.

“You’re in the Army now. You’re not behind the plow. You’ll never get rich by digging a ditch. You’re in the Army now.” Leo sang it well enough with his soft sibilant Hungarian accent. “Here is my question. Why won’t I get rich digging a ditch? Ferdinand de Lesseps made a fortune digging a ditch.”

“LEO!!!!” *Scusi. Scusami*. We are all very tired.”

“Have you seen this movie, *Buck Privates* with Lou Costello? He is a very funny man. He reminds me of you, Enrico. ‘Abbott!!!!!’ This is what he shouts. ‘Abbott!!!’ He could be shouting ‘Leo!!!!’ It would not surprise me at all at this point.” Herbert surrendered to helpless laughter.

“Go home, Leo. You are of no use to me like this,” said Fermi.

“I have no home. For ten years I have no home. I live in an itinerant bathtub. It follows me from country to country, from city to city, from hotel to hotel.”

“You live in your head, Leo.”

“There is a bomb in my head. It is not safe there.”

“Please go home. Anderson and I will write up our notes.”

Leo struggled out his corner of the sofa, brushed himself off. At the door he stopped with his hand on the brass knob and said, “Wait a minute. I said something important a moment ago. What did I say? It was very important.”

“You said you know what the problem is.”

“Yes! That’s right. But what did I mean? I had a brilliant thought. It will come to me. Give it time.” He walked out and closed the door behind him.

“Do you think he is losing his mind?” Herbert asked.

“I don’t really care. His mad ideas are often his best.”

“Enrico! Herbert! Come with me. I’ve got it. Let me show you!” Leo was shouting from the stairway. Now he was back in the doorway his eyes bright as a child’s. “Yes yes yes. By Jove, I’ve got it!” He ran down the hall with his hat in his hand and bounded down the stairs two at a time in his heavy leather brogues. Fermi and Anderson followed him down to the cellar where the abandoned squash court had been turned into a temple precinct for burnt offerings of the radioactive kind. The altar was twelve feet square and about sixteen feet tall. It was composed of bricks of pure graphite and spheres of uranium 238 oxide with a tiny less than one percent impurity of uranium 235. But unlike the Hebrew calf without blemish, it was the impurity that pleased God that he might bless it with criticality, the first inkling of a chain reaction. They called it Chicago Pile-1. In ancient days it might have been The Holy Of Holies. Or it might have been the sarcophagus for a mausoleum that led to the underworld.

Leo went eerily still. For the first time all night he did not speak. Uranium, he heard his inner voice say, my greatest love, my deepest fear. The only element in the periodic table that sustains chain reaction. What if you didn’t exist? Would we rest easy knowing that the bomb was a fiction? But you do exist. Your chain reaction is not a myth. Your bomb is not a fantastic dream. It is my recurring nightmare. If you didn’t exist, we would have to invent you.

“What are you thinking, Leo?”

“Carbon dioxide!”

“What??”

“Instead of air. Carbon dioxide! We pump it in. It fills every crevice in the pile. It boosts the neutron effect.” He turned to them and shrugged. “Sometimes I amaze myself.”

Fermi and Anderson exchanged a look.

“He may be onto something, Enrico.”

“You’re crazy, Leo.”

“I’m crazy like a fox.”

“You would have to make the pile airtight? How could you possibly do that?” Fermi asked.

“We encase it in a big balloon. I will call the Michelin company in the morning.”

“We don’t have Michelin tires in America,” said Anderson.

“What do you have?”

“We have Goodyear.”

“I’ll call Goodyear in the morning.”

“Rico, we’ve got a couple of visitors,” said Leo under his breath.

Fermi looked out into the hallway. “Who invited these guys?”

“They seem to have invited themselves.”

Fermi, Szilard and Herbert Anderson exchanged glances.

“Why is this happening, Leo? We are top secret. Nobody is supposed to know about us except the NDRC and maybe a few people at the University know a little something.”

“Herbert why don’t you find out what they want. I don’t have time for this.”

Generals, majors, congressmen, all these people hovering over the project trying to get their two cents in when in fact he didn’t have the time and he didn’t need the money.

“Gentlemen, come in. What can we do for you today?” Fermi was more curious than alarmed.

Kusevitch lumbered in like a pachyderm from the Lincoln Park Zoo. Kucharski skittered behind like a rat who did not wish to get stepped on.

“I am Fermi. This is Herbert Anderson my right-hand man. And Leo Szilard who is our procurement officer so to speak.” Fermi had been working on his American accent. The result was not so much comical or incomprehensible as it was oddly sincere.

‘Yeah, ok. I am Alderman Kusevitch and this is my associate, Mr. Kucharski.’ The two of them had been standing in the hallway smoking. Kusevitch was the one in the camel hair greatcoat. Kucharski was the one in the alligator shoes. “Which one of you guys is the brains of the outfit?”

“We all are.”

Kusevitch didn’t seem to like that answer, so he shifted gears. “Gentleman, let’s put our cards on the table, why don’t we? My colleague and myself, we are just a little bit nervous about what we have been hearing about your project here.”

“What have you been hearing?” Fermi asked.

“Excuse me for asking but is this thing you’re doing, this experiment or whatever you wanna call it, is it *safe*? I mean are you guys gonna blow us all to kingdom come in the name of science? Do you really know what you are doing here? Forgive me for being blunt about it.”

“What we do here is completely safe, Alderman. Or we don’t do it. Is this not obvious?”

“Maybe yes maybe no,” said Alderman Kusevitch’s associate, Mr. Kucharsky.

“How do we know you guys aren’t a bunch of mad scientists down here spitting atoms or whatever it is you are doing?”

“*Splitting* atoms, Alderman Kusevitch.

“Ok, *splitting* atoms. Is that supposed to make me feel better? This atomic power thing you are experimenting with. And e equals em cee squared and all that. Look, I represent the good people of Hyde Park. I wouldn’t be a very good alderman if I let my ward get blown to kingdom come. Let alone the entire South Side of Chicago. I would be out of a job, wouldn’t I? I mean it stands to reason I come down here and ask you gentlemen, are you sure this thing is a hundred percent safe.”

Szilard was already a little hot under the collar but he managed to ask nicely, “I’m going to ask you a very important question, Alderman. I hope you will understand when I ask you how the hell do you know so much about this operation. This project is top secret. We do not even officially exist. The scientific community knows nothing about us and neither does the Congress or the Senate.”

“This is my Ward, fellas, the 4th Ward. You understand? It is my job to know what is going on in my ward. I got people. And my people got people. A rat doesn’t come out of the sewer here without I don’t know about it.”

“I sincerely hope Adolph Hitler does not know what you know.”

I don’t think Adolph Hitler has as many people as I got. Leastwise not in my ward he don’t. Does he, Walter?”

Walter jumped. He was not prepared to speak at the moment.

“Alderman Kusevitch.” Fermi shook the Alderman’s meaty hand. Fermi had shaken a lot of meaty hands in his day, most of them *Fascisti*, most of them smug idiots who could barely tell time if Mussolini didn’t give them a hint. But this was America, the land of the free, the home of the brave. He would be only too happy to accommodate these gentlemen in any way he could. “I appreciate your concern. Let me tell you we do everything in our power to make our project safe.”

You’re from Italy, aren’t you? A great many of my constituents are of the Italian-American persuasion.”

“I am from Italy, yes. But I come here for freedom. For opportunity. “

“Good for you, Mr. Fermi. We got plenty of freedom and opportunity to go around. I just wish you could explain it to me in so many words how I can go home and sleep at night knowing the world is not going to end while I do.”

This is where Leo felt it was necessary to set these bozos straight. “Alderman Kusevitch, this is a mathematically controlled experiment. We have done extensive mathematical calculations of the energy released by uranium fission and we have constructed the nuclear reactor core so that it will never....”

“Whoa whoa whoa,” said Kusevitch giving Leo the once over. “Those words. Nuclear reactor. Those words sound like they are from outer space. I’m already getting a chill just hearing those words. Like it’s something out of that War Of The Worlds thing.”

“No no. This is science. Nuclear fission is a principle that has been observed ---”

“Nuclear fishin’? Am I hearing that right? You are doing some kind of fishing expedition down there, like some underground river kind of thing?” Kucharski had spoken.

“Idiot, let me do the talking,” Kusevitch muttered under his breath. Leo suppressed a smile.

“Nuclear fission is another word for atom splitting, Mr. Kucharski. We split the atom. It releases energy. But we keep it under control.”

“Ah! Ah ha! That is the sixty-four-dollar question, ain’t it? How do you do that? How do you keep it under control?” Kusevitch was fairly certain he had them where he wanted them. In a moment of overconfidence, Leo took a sheaf of papers out of a folder on Fermi’s desk.

“Alderman, this is a calculation of the kinetic energy that will be generated by the Chicago Pile-1 in its current configuration. These numbers are very precise. They prove quite clearly that the pile can be controlled so that it creates only enough energy to light a lightbulb.”

Alderman Kusevitch took a pair of reading specs out of his breast pocket and placed them on his face and looked first at the formula Leo was pointing at.

“What am I looking at?” he asked.

“This right here is the basic form of uranium fission. So all we have to do is plug in the values for $m(^{92}\text{Kr})$ and $m(^{142}\text{Ba})$ and we see that U235 creates 200 megaelectronvolts per atom. OK? So far so good. So now you ask will ask how many atoms are we talking about. Well that is the question isn't it, Alderman. How many atoms are we going to split and how much energy are we going to release? And the answer is that for one kilogram of uranium 235 the calculation is as follows.” Leo pointed to the top of another page of calculations which read as follows:

One mole of 235U has a mass of 235.04 g; thus, there are $(1000 \text{ g})/(235.04 \text{ g/mol}) = 4.25$ moles.

“From this we conclude that the number of 235U atoms is what you see here.” With a flourish Leo produced the result.

$(4.25 \text{ mol})(6.02 \times 10^{23} \{235\text{U}/\text{mol}\}) = 2.56 \times 10^{24} \text{ 235U}$

“And so the total energy released is in this formula,” he continued.

$$E=(2.56 \times 10^{24} \text{U})(200 \text{ MeV/235U})(1.60 \times 10^{-13} \text{ J/MeV})=8.21 \times 10^{13} \text{ J}$$

Leo turned the paper around so that the Alderman could read it more easily. “Which may seem like a lot to you but you must remember that we have many safeguards in place that prevent the entire kilogram of U235 from being fissioned. We control the reaction. We remove neutrons from the reactor pile as we see fit and we monitor the heat energy of the pile at all times so that we can keep the nuclear reaction at a very low rate. Think of it like a car that idles as opposed to a car that roars off at one hundred miles per hour. We throttle down and we put it in first gear so to speak.”

“Are you serious? Look at this guy, Walter?” Walter wasn’t sure how to do that. “You seriously expect me to believe you write a bunch of stuff down on a piece of paper it looks like something my kid would draw in a sandbox and I’m supposed to accept that this piece of paper is going to keep Hyde Park from being blown off the face of the earth?”

“Yes, that is exactly what I expect you to do, Alderman. This happens to be conclusive proof.”

“It ain’t conclusive to me. To me it looks like a piece of paper. How is a piece of paper gonna prevent this thing from blowing sky high? That is not possible.”

“This is how science works, Alderman.”

“Well screw your piece of paper, Mr. Szilard and screw you. I’m gonna speak to the Mayor about this nonsense. You’re gonna split the atom over my dead body.”

“Please, Alderman. You have to understand. This is science. These are facts.” Leo had grabbed the pages in one hand and he was waving them around. “If we don’t do this, Adolph Hitler will and then where will Hyde Park be?”

“Look at him, Walter.” Walter thought he was looking at him and he would just keep doing what he was doing. “He looks like Chamberlain with his cockamamie ‘Peace in our time,’ waving it around in the newsreels. I’ll tell ya something, Mr. Szilard (and where the hell are *you* from, by the way?), I didn’t trust Chamberlain as far as I could throw him and I don’t trust you, mister.”

“Let me tell *you* something, Alderman Kusevitch. If you breathe a word of this to the Mayor of Chicago, you and the Mayor will both wind up with a squad of MP’s in your office who will escort you to a military brig where you may have the opportunity to sit out the war in peace and quiet.”

“You lousy little jewboy, we will see who sits out the war and where they do it.”

Leo reached for the Alderman’s coat collar.

“Mr. Kusevitch, Leo,” Fermi stepped between them. “I get on the phone with Dr. Sachs who heads up the National Defense Research Committee.” Leo was trying to reach around Fermi to get at the Alderman, who was being restrained by his sidekick Kucharski. Fermi’s voice rose higher and higher as he tried to stem the tide. “Dr. Sachs is the guy appointed by the

President to oversee this project. And I am going to have one of his best men call on you and he's going to explain the situation to you in detail. Then you feel safe, yes? that you and the good people of Hyde Park and this whole South Side, you are in good hands and you got nothing to worry about here. How do this sound to you, Alderman?" Kucharski had wrested his partner back to the doorway and almost had him out. Fermi had a hand on the doorknob.

"I better hear from this guy, Fermi. I better hear from him very soon." He started down the hall to the stairs.

"Keep your powder dry, Alderman," Leo couldn't resist getting in the last word. "You may need it to blast your way out of prison." The Alderman was out of earshot. "Lousy Pollack," he muttered as he closed the office door.

Fermi, Szilard and Anderson took a moment to calm down.

"Leo, what is a Pollack?"

"This is what they call a Polish person in America, Rico."

"Pollack. This is a good word. I like it."

"Are you really going to call Dr. Sachs?"

"For that lousy Pollack? Not in a million years."

Chapter Ten

First Inking

February, '42

Fermi was just thinking out loud. He did that when he was relaxed. When things were going well. When the food was good, which it was at Catania on Amsterdam Avenue, surprisingly enough. In fact they had served the right pasta with the right sauce which seemed to be a thing of no concern at most of the Italian restaurants he had visited in New York. They seemed not to know which white sauces used cream, which used egg and which used cheese. Some guy with a small but lively white tablecloth place put a cheese sauce on a fish and pasta dish and he very nearly had words with the kitchen staff. And the reactor project was going well enough considering that he and Szilard were at each other's throats about the heavy water issue. Problems were being solved. The work was progressing. He was sitting in a sturdy black lacquered chair at a small black lacquered table with a thick white tablecloth and thick white dinner napkins. They sat in the back away from the windows and comfortably secured by the clanging and the rattling and the shouting and the swearing that came from the exuberant kitchen. The day was overcast but the light from the chandeliers glowed over the room, reflecting off the tin ceiling, and seemed to singe the red wallpaper. The cigar was just starting to bite nicely into his tongue when he mentioned to Teller that he'd had this crazy idea the other day.

“Oh, yes?” said Teller offhandedly. Fermi was always having crazy ideas. Sometimes you could make sense of them, sometimes you realized life was not long enough to keep up with Fermi’s fertile imagination.

“The heat from an atomic bomb in the first few milliseconds, it is tremendously hot, you know. Hot like interior of the sun. This was what I am thinking, well not so much I am thinking as it just pops into my head.”

Teller wasn’t really listening. He was leaning forward to carefully crown the ash of his cigar in the ashtray that sat in the middle of the table. He didn’t want to get cinders on the tablecloth. The place was modest and immaculate, but the waiter who handled the room had a swagger in his step and a look of propriety in his eye that made him feel comforted and threatened at the same time, which is exactly what you want, he had discovered, in a good Italian restaurant in New York City.

“So maybe you can use the heat from the ignition of an atomic bomb to heat a small amount of hydrogen like it is heated in the sun. And fuse it into helium like it is fused in the sun. And boom you got a whole new kind of nuclear reaction.”

Teller felt something like an electric current flow slowly up his spine.

“And this new kind of nuclear reaction is gonna release a truly enormous amount of energy. I don’t swear by my calculation but it’s not very complicated.”

By this time the electric current had lit up the back of Teller’s neck and entered his brain where the spinal cord inserted itself into the skull.

“Maybe a thousand times more energy in each atom than you get with the fission of uranium.”

Teller was no longer in the room in any meaningful sense. His head was cocked to the right very hard and he was looking down as if he had set the worn wood floor on fire. But his inward eye was on a mental blackboard where he was scribbling down variables and constants.

“That’s a wild one, huh? I don’t know. It just comes to me the other day. Out of the blue for no reason. And this second thought that the binding energy is a thousand times more for hydrogen than for uranium. Why does this not occur to me before? Who knows? Anyway. I mention it. Not that it means anything. It just occurs to me. Good for a laugh, right?”

The energy unleashed in fission is the energy that binds the heavy cumbersome uranium atom together. You split the atom into barium and krypton atoms and the two smaller atoms each require a bit less than half the binding energy of the uranium atom. The missing energy goes boom, hopefully on Hitler’s head. The energy released in a fusion reaction in the sun is the binding energy of two hydrogen atoms which is far far greater than the binding energy of the helium atom they fuse to form. So the extra energy could go boom like nothing anyone had ever imagined before, and that anyone included Lawrence and Szilard and Oppenheimer. Of course of course of course! Fermi, you madman. Your crazy is most men’s genius.

Fermi sat contentedly smoking his cigar. He seemed to have drifted away to another train of thought, but Teller was riveted. His furrowed brow pressed his dark abundant eyebrows down over his eyelids. What a preposterously simple idea. What an elegantly beautifully powerful mad unholy Rasputin of an idea. He looked at Fermi who was now smiling at something, who

could tell what, probably something his children had said at dinner or breakfast or at bedtime, not that he was there for any of these events but Laura would have related the event to him in a quiet moment with the same delight she had taken in the presence of her little ones.

Now this was an idea that Edward Teller could wrap his head around. Fission was a pedestrian fact to him. Fission had been solved for all theoretical purposes. It was now merely an *engineering* problem. Leave it to the auto mechanics, the grease monkeys with their socket wrenches and dipsticks to work out the details. It interested him not at all. The whole thing was going to be a time-consuming drudgery and in the end they would have their bomb and it would go boom over Germany. Where was the excitement in that? Other than the part about Germany, which made him sneer with quiet glee. The only urgency in the whole matter was in the race with the *Wehrmacht* and really it was an *engineering* race. The physics was settled. But this new idea, this hydrogen fusion idea, he could feel his hands shaking as he mentally reached for a slide rule. He could hear himself marshaling facts to explain to Wigner or Oppenheimer, whoever would listen. He would have to get home and get to work. He would need to lock himself away for days on end to verify the known math and get an idea of what needed to be explored. There were all kinds of mathematical issues that would require his deep and undivided attention. He would need to peer into the hydrogen atom and the helium atom, calculate the exact value for energy released, the trigger that would destabilize hydrogen, investigate the delicate interplay between the strong force and the electromagnetic force (and ok yes the weak force) that would transmute it into helium. Like the alchemist stirring his boiling cauldron of esoteric ingredients he would need the necessary incantations spoken in the secret languages of calculus, analytic geometry and matrix mechanics. He would speak and Nature would hear him.

Fermi was looking at him now.

“What is this look on your face, Edward? Are you in pain?”

“Enrico, will you excuse me? I have to get back to my office immediately.” He would commence work on this monumental new idea. Not ten thousand tons of TNT in a bomb but a million tons of TNT in a bomb. Enough to wipe all of Germany off the face of the earth. To pour its ashes into Trotsky’s dustbin along with Trotsky, Lenin, Stalin and the Soviet Union. A radioactive dustbin of death for all of Teller’s enemies. Fusion. What a brilliant idea.

“An excellent meal, Enrico. I hope you enjoyed it as much as I did. And thank you for the conversation.”

“Edward, forgive me. I daydream. You know how I am. These silly ideas, they come to me and I feel the urge to tell someone. Forgive me.”

“I do, Enrico. Of course I do. *Ciao.*”

Here was a project worthy of this miserable war. Here was the scientific challenge for which God had given him wit and taught him to write the laws of nature in the language of mathematics: to bring the power of the sun to bear on the enemies of freedom. To incinerate. To obliterate. To destroy utterly. You take this piddling atom bomb of yours, gentlemen, the one you thought would win the war, and use it as a trigger for the real bomb. The Superbomb. The Super, yes. So much work to do. So many calculations to do, experiments to suggest. It was like a blessing from Yahweh in wartime. The Children of Israel had done evil in the sight of their God. And Yahweh had sold them into the hand of Herr Hitler. And they cried out in their

sorrow and their shame. And Yahweh raised up a deliverer, a Judge for his people, this devout man Teller. And He said, Teller, rise up and go forth and wield this nuclear weapon against the enemies of the people and I will give the enemy into your hand.

It was enough to make you believe again in all that childish nonsense.

Fermi watched him go and returned to enjoying his cigar alone with his thoughts. Only Laura's deep black eyes could penetrate the lead that protected his radioactive mind. When she pressed a hand against her head and piled the hair way high up in a manner that seemed to him both calculated and absentminded, he lost his concentration. When a subtle smile barely played across her face like a slight wince of pleasure, tightening her lips, sharpening the glow of her freckled cheeks, he stopped thinking altogether. "Laura, why do you love me so?"

"Because you are radioactive, *mi amore*."

"*Si. Capisco*."

Do you, Rico?"

"*Si, mi amore*."

Teller kept that idea in his back pocket all spring in New York and into the summer in Chicago where Groves had concentrated all work on the bomb into one location, where Fermi was looking for a location for his first real nuclear reactor. Then Oppenheimer called them all together in the cool summer air of Berkeley, California to share what they knew, learn what they could from each other, cross-pollinate and put their heads together for their mutual benefit, all the while jockeying for position in the intellectual hierarchy, earning their stripes and then their

bars in an intense competition. And even fall in love. Yes, he was a little bit in love with Robert Oppenheimer. How could you not be? You would have to be blind or dead to the world. A colloquium Oppenheimer called it in the already nostalgic lingo of the academic world which had been nearly snuffed out by the secrecy and the penury of the War. Oppenheimer had assembled an orchestra which he conducted to stunning effect, helped in all things by his perfect pitch and photographic memory for the score. He knew every measure, every notation on every passage. He seemed to know what they were going to sound like together before they began to play. And then he got them playing and they became the San Francisco Symphony of Modern Warfare. How did he do it, Teller wondered? Orchestras don't play themselves anymore, not since Mozart, whom he loved even more than Oppenheimer, but oh you kid! The elegance of Oppenheimer's language, English though it was and American English at that. The gorgeous orderliness of his ideas, his ability to see the big picture, the integrated sound of their complicated syncopated vigor. So ok yes he wanted to make an impression. He wanted to be brilliant, maybe even blindingly brilliant. They met almost daily in Oppenheimer's office in LeConte Hall, the windows obscured, the stairway guarded. Each day the chairs started out in an orderly grid and ended up in a scrum.

Back in Chicago Fermi and Szilard nearly came to blows over the heavy water issue. They spat facts at each other regarding the suitability of heavy water versus carbon as the proper

material to mediate the chain reaction of Uranium 235. Fermi the goddamn idiot insisted they use deuterium also known as heavy water to keep the chain reaction under control. Szilard the little lizard demanded they drop all thought of heavy water in favor of carbon graphite before he lost his florid Hungarian mind from frustration. Fermi had his very clever calculation that showed easily they could ramp up work using a chamber of heavy water in which the uranium core could be submerged like a hot stone in a bathtub. How quaintly Italian, Enrico. Why don't you go play cards on the Riviera and leave the real thinking to me? Szilard droned on and on about the simplicity of graphite, its ready availability and this ridiculous argument that it would take longer to manufacture enough heavy water for the reactor than it would win the damn war. How could he possibly know how long the war was going to last? Really how can anyone work with the man? The only thing they agreed on was Teller. He needed to shut up about fusion. When Teller left for Berkeley they were relieved to be rid of him and he was relieved to be gone.

With pencil, paper and slide rule, Szilard calculated late into the night refreshing the warm water in his tub, living on the border between too hot and too cold, nursing the temperature like an alcoholic who keeps the buzz going indefinitely on the border between sobriety and drunkenness, that no man's land of inebriation. Layers of uranium and graphite like a layer cake had been a good start but he turned his thoughts to spheres of uranium placed in a stack of graphite at precise distances from each other so the graphite could most effectively slow the neutrons. He filled pages. He wore down pencils. He held in his head a program of calculations that would lead him to the nuclear point of no return. He figured they could do it with fifty tons of graphite and five tons of uranium. He could build a nuclear reactor for \$35,000. About the

cost of a Broadway musical by Mr. P. G. Wodehouse, whose musicals were very good indeed. Maybe now Fermi would shut up about his heavy water nonsense.

Finally, Fermi and Szilard are in agreement. Like Imhotep, the Egyptian architect of the early structures on the plains of the Nile who perfected the art of building the Pharaoh's pyramids, each one bigger, heavier, taller, more expensive, requiring more manpower, more organization, more mudbrick, more stone, more time, more faith, more tyranny than the one before, Fermi builds reactor cores of uranium and graphite in Chicago, each one closer to a self-sustaining reaction than the previous one, each one larger, denser, more intricately constructed, more mathematically exact, more scientifically exalted than its predecessor. Both endeavors are monuments to death that claim to give meaning to life.

I can feel myself coming together, rising into consciousness.

The Summer of '42.

Teller was relieved to get out of Chicago and join Oppenheimer's summer conference in Berkeley. He did not want to be the parent in the room to Fermi and Szilard. He did not want to babysit their quarrels. He realized he was an odd man out in their fission game. There was no natural precinct for his ideas. Fission was a solved issue. Fermi was building his nuclear reactor

step by step. Everybody had his work to do except Teller. He needed a project. He thoughts had turned back to the fusion bomb, the Super.

Oppenheimer had the reputation. He had the institution. He had the classroom space. But most importantly he had the confidence to bring them all together knowing he could keep up with the most brilliant among them at whatever game they played, from whatever angle they approached nuclear physics. He had the confidence you only get from teaching, the eloquence you get from talking and thinking on your feet all day, from staying one step ahead of your headstrong, arrogant grad students who don't know what it is they don't know. Teller admired that. He wanted to see this guy in action. He wanted to take his measure. Could he really be as good as they all said he was, another Ernest Rutherford, another Niels Bohr, another Max Born?

Someone was at the blackboard in Oppenheimer's office where they had all come back from a cheap and leisurely lunch. He was trying to make a point. No one was really listening. They passed around a copy of the Chronicle with the bloody story of Guadalcanal all over the front page. Teller was sitting at the window with his feet up on the windowsill.

"I have a thought," he said from out of the whirlwind.

"We don't want to hear it, Edward. We have work to do." It could have been anyone. They were like a Greek chorus. They spoke as one. They thought as one. They chastised him as one. But that is how it is with tragic heroes. Everyone cries woe is me and tells you what you have done wrong, how you have offended the gods, how you will suffer for your sin, but no one else steps up to lead the way. No one else puts his ass on the line. All they do is prance about in

unison and sing and make sure their togas don't get soiled in the amphitheater. It could have been any one of them. But it was probably Felix Bloch.

"I will tell you my thought."

"How long is this going to take?"

Or was it Oppenheimer's guy Serber? Teller didn't care to look and see. "I don't know. I haven't finished the thought. I have only begun it." There was laughter. There were groans, exasperated sighs. Teller got to his feet and looked out the window.

"Don't jump, Edward. Tell us your thought."

He reminded them of his conversation with Fermi from the previous winter. He had gone back to his rooms and he had begun to work on this idea of a fission bomb triggering a fusion bomb. How it had captivated him. He noticed that Oppenheimer was at his desk scribbling some note on the front page of a research paper. He couldn't see whose it was. He had come, he said, to a very simple conclusion.

"Tell us your very simple conclusion, Edward, so we can get back to work."

"I saw immediately after that lunch with Fermi that the fission bomb acting as a trigger for the fusion bomb would generate an enormous amount of x-rays, which was exactly what you would want, very high energy light particles of light that would generate an unheard of interior-of-the-sun-like amount of heat."

"Yes, Edward. This is settled law."

“But too quickly, too blindingly fast to allow two hydrogen atoms to heat up and fuse,” Teller continued. “The energy would dissipate before it could trigger the bomb. So a hydrogen atom would sit there like a lox instead of fusing with another hydrogen atom to form helium and release an enormous amount of energy, in other words a complete waste of time.”

“Thank you, Edward, for telling us about your complete waste of time.” More laughter.

But this was an itch he had continued to scratch in the privacy of his own thoughts.

“However...” He spoke in his lowest bass register. He let the note hang there a moment.

“I have been talking to Bethe.”

“Hans, is this true? Have you been talking to Teller?”

“I owed him a hearing,” said Bethe. “You all know I have been skeptical of this whole bomb project from day one. It seemed so utterly farfetched I was almost ashamed of you all. But Edward brought me out to Chicago and showed me what Fermi was building and it hit me like a shot. This thing could work.”

“For which we are all very grateful to Edward. Aren’t we, gentlemen?” A general round of pleasant murmurs suggested this was so.

“I have been picking his brains on the subject of stellar fusion,” said Teller.

“Has he, Hans? Has he been picking your brains?”

“I suppose he has. He is very persistent. I have the scars to prove it.” Even Teller smiled at that remark.

“And I see now my calculations missed an important point.” Teller continued now feeling a little more comfortable with Bethe in his corner. “The x-rays created by the nuclear trigger propagate much more slowly than I had at first realized.” He went to the blackboard and drew a quick calculation. “You see?”

“What are you saying, Edward, in plain English?”

“The x-rays will *not* dissipate ineffectively and harmlessly. They will build up slowly enough to ignite hydrogen, so one may further consider the possibility that the Super will work. And so that is what I have been doing. I have been considering the matter in more detail. Konopinski and I.”

They turned as one to find Konopinski in the room. He was by the door, smiling an only slightly embarrassed grin. “We have done a lot of work,” he said.

“Oh come on, Edward. What is the point of all this?”

“The point? I should think the point is obvious. If we have thought of it, they have thought of it. If they thought of it, they will build it. Do you wish to be annihilated by your own indifference?”

“Please don’t play that card, Edward. It is very tiresome.”

Oppenheimer was doodling around the notes he had made on the research paper on his desk. He was considering several possibilities. One. Teller was just showing off. He had a big ego. Two. Teller was a disruptive troublemaker. He hid a lot of anger beneath his quiet manner. Three. Teller needed to run free. Some people could only work completely unfettered

and unsupervised. Four. Teller had a chip on his shoulder. He was daring someone to knock it off. Probably four, he thought. In the old days Oppenheimer would have knocked it off without a second thought. It had been like a reflex action the way his acid tongue flicked out at its target. Now he restrained himself with curiosity and maybe even a little sympathy for Teller's hyperactive aggressive mind. Who was this Teller, really? How could he be coaxed into some kind of productive endeavor?

Bethe was wary of Teller. He had asked a lot of questions but Bethe had answered very few. He never imagined that Teller was merely curious about fusion, that he simply wanted to know what Bethe had learned about the furnace of a star, but he kicked himself to discover that Teller had been using him to feed this Super obsession of his.

“Edward, correct me if I'm wrong...,” he began.

“Have no doubt of it.” Bit of a laugh on that.

“But it seems to me the whole point of this hydrogen super bomb is that deuterium is cheap and easy to make as fuel for the fusion bomb as compared to uranium for a fission bomb or a plutonium for a fission bomb. But isn't the whole point blown completely to hell if you tell us you need a uranium bomb or a plutonium bomb to ignite it?”

Oppenheimer stirred. “He's got you on that one, Edward.”

“Oppie.” Edward felt a tug in his chest at this criticism. “We must proceed along both paths at once. If we do this right, we will have Super when we have a uranium bomb. Or very nearly.”

“Very nearly only counts in horseshoes, Edward.”

“Tell me something.” Oppenheimer fixed his gaze on Teller. It felt like the gaze of a beautiful woman going through him, anticipation, confusion and an awkward shyness. “What do you estimate to be the destructive force of this Super of yours.”

Ah he liked that. It was his Super, Teller’s. His idea, his territory now, his bomb. “Very roughly, gentlemen...” They all knew that when Teller addressed them as gentlemen he had something significant to say. It was Teller’s tell. “Konopinski and I have come up with a number.”

“Drum roll, please,” said Robert.”

“12 kilograms of deuterium will give you a bomb with the explosive power of one million tons of TNT.”

“Or 200 uranium bombs,” Konopinski added.

Shocked silence. Maybe even a stifled gasp. You could hear voices four floors down in the quad.

“Jesus Christ, Teller. I mean Jesus Christ almighty.”

“Are you out of your mind?”

“Seems about right,” said Bethe as softly as he could, but his voice cut the silence like a newly sharpened knife,

Oppenheimer stood up. His mouth was open, his jaw set. He was staring at Teller but he was looking inward. “Too big,” he said. “Too big. What the hell do you think you can do with a bomb like that?” He sat back down. “Too big, Edward. Has that not occurred to you?”

“Madman,” muttered someone in the back but no one turned to see who it was. It was what they were all thinking.

“Let us consider this number given us by Mr. Teller in the light of Halifax, shall we?” said Serber.

“And Mr. Konopinski,” said Teller to indicate he would fight back.

“And Mr. Konopinski, yes thank you for reminding us. December 6th, 1917. 5 kilotons of ordnance in the form of TNT exploded in the Halifax harbor. Four thousand dead. Ten thousand injured. Halifax gone.

“One-mile radius gone. To be exact.” Teller corrected him.

“Yes thank you. One-mile radius obliterated. The rest of Halifax barely worth saving. So let’s extrapolate, shall we? One million tons divided by five thousand tons equals a blast 200 times larger than Halifax. Therefore a 200-mile radius. Drop it on New York and New York is gone end to end. Boston and DC barely worth saving. 30 million dead? Educated guess.”

“Drop it on Germany and the war is over,” said Teller

“And we are damned for all time,” said Bethe.

“All right, Edward. You’ve got our attention,” said Oppenheimer after a decent interval. “Do you suppose you might find your way to building a smaller one than that?” And by some miracle that was Oppenheimer, they all laughed. Teller beamed. He loves me. I know he does.

Emboldened, he went to work on his Super bomb. It energized the whole place to his evident satisfaction. He was Moses come down from the mountain with his stone tablets of The Law to galvanize his wayward people, to smash their idols and put the unbelievers to the sword.

“He is wreaking havoc,” Serber shouted at him in his office. That’s what he loved most about Serber, how much he cared.

“No more than you, Robert,” Oppenheimer shot back.

“You know that’s not true. He is wasting your time. He is wasting everybody’s time.”

“I’m not so sure.”

“Yes you are. You are coddling him. Fine. Coddle him. But stick him in an office and don’t let him out. Why does he always have to be the loudest voice in the room? I can’t stand it.”

“I can’t do that, Robert. He is making a presentation today.”

“Now what?”

“Who knows? That’s what I like about him. He comes at you out of the blue. He keeps you on your toes.”

“He is a grandstander”

“What is that, baseball?” Oppenheimer enjoyed reminding him he knew nothing of sports.

“He is a loudmouth.”

“The pot calls the kettle black.”

“You don’t fool me for a second with this suave indifference.”

“I have never been accused of being suave.”

“Who are you kidding, Oppie? You are the lady’s man of Nuclear Physics. They all love you, Teller included. They are all panting after you, begging for your favor. You are playing a dangerous game. You can’t play it that way. A spurned lover is a deadly enemy.”

He knew Serber loved him and feared being replaced by Teller. Serber thought he only kept him around because he was an uncanny, unerring, profoundly quick calculator, which Oppenheimer was not. At Göttingen they said, “You screw up the constants systematically, Oppenheimer. You will never amount to a hill of beans.” But he knew differently because they had nothing to calculate without his theoretical insight. They would have been calculating how many angels could dance on the head of a pin without him.

“I can handle him, Robert. Just come to the meeting today. I may need your help.”

“There! You’re doing it. You’re buttering me up. Fine I’ll be there. I am on your side.”

“I know you are.”

“But Edward Teller is a madman. You can make book on that.”

“Baseball again?”

Teller heard them arguing as he shambled bearlike into the room, not that he felt the least bearlike. Indeed he felt rather light on his feet, nimble in fact. He grabbed a chair from the back and swept it up to the front next to Oppie’s desk, sat down, crossed his legs nonchalantly and turned his attention to the crease in his suit pants as if he had nothing at all on his mind, a man of leisure who might take the time to spruce himself up a bit or not, beholden as he was to no one, dressed for no one’s benefit but his own. They all came wandering in. He knew they suspected nothing because he had sworn Konopinski to secrecy. When they saw him sitting next to Oppie’s desk they each reacted in some visceral way that he registered out of the corner of an eye as he shuffled the notes in his lap. No doubt they now expected some small piece of encouraging news about his Super project, some facet of fusion theory, some detail at which they could all sigh with skeptical derision, “Oh please Edward, do you really expect me to believe this?” Or “Understand this?” Or “Incorporate this in our planning?” “Drop everything to celebrate this.” (Choose one or more of the above.) Bethe sat in the back. Probably so they would not all take their cue from him given that he knew more about the interior of the sun in general and fusion in particular than all of the rest of them put together.

“I’m giving Edward the floor today. He wants to report to us on a revision in his fusion research.”

Bodies shifted in chairs as if they were screwing themselves into place for safety’s sake or perhaps to prevent the urge to bolt on instinct.

“I wonder if it has occurred to any of you gentlemen....”

He called them gentlemen again. One or two ducked their heads as one does when flinching in anticipation of a blow.

“...that there are other candidates for fusion besides deuterium.” He noted the quizzical grimaces.

“Nitrogen for example has an instability that makes it susceptible to a nuclear fusion reaction. Dr. Bethe has described this in his '38 paper, how nitrogen in the interior of a star is involved in a complicated cycle of fusion reactions.” Bethe began to blink furiously in the back. “Is that not so, Dr. Bethe. You explained this to me on the Twentieth Century Limited as we made our way to Berkeley from Chicago last month.

Bethe was about to remark that a little bit of knowledge is a dangerous thing, but he did not. He said, “Yes, I suppose I did. I call it the Carbon Nitrogen Oxygen cycle.”

“And they may very well give you a Nobel Prize for it if they are still giving out prizes when the War is over.”

“Don't flatter me, Edward. I know the value of my work.”

Teller turned bright red but continued. “I propose therefore we must ask ourselves this. If a fission bomb can ignite hydrogen into a fusion reaction, can it not ignite the nitrogen in the atmosphere? Might a fission bomb set the atmosphere on fire and create a self-perpetuating reaction that would destroy all life on earth far more effectively than Herr Hitler?”

Oppenheimer rubbed his forehead with his palm as if he were trying to relieve a sudden stroke-like pain. Bethe grabbed both arms of the chair. Konopinski wore a smile on his face so tight it might never come off. Someone whistled.

“Is this a joke Edward?” Felix Bloch wondered aloud. “We might also ignite all the water in the ocean since it is made of hydrogen.”

“I was getting to that,” Teller replied. Bloch snorted. “Recall if you will that this fusion phenomenon is not a chain reaction like fission. It does not require a critical mass. It is driven by the 4 million degrees of heat created by the atomic bomb. It might explode in the air and incinerate the sky. It might explode in the water and incinerate the sea.”

It might the multitudinous seas incarnadine, Oppenheimer heard himself think. Everyone looked to him for a way to respond.

“I must say it surprises me it has not occurred to anyone here besides myself,” Teller continued. “Perhaps that is because I am the only one who has taken the Super to heart.”

He could feel the consternation in the room, that unsettling of profound minds. He would not be set in a corner on a stool wearing a dunce cap. He would not be left on a railroad siding to ponder his little fusion puzzle in a boxcar in some unreachable end of the trainyard. Again, he had their undivided attention. The size of his scientific imagination should now be apparent to everyone there, but especially Oppenheimer, whose intellectual vigor matched his own in its elasticity, its breadth, its lightning-quick absorption and integration of facts and hypotheses. He had stolen a march on them and attacked at dawn.

Oppenheimer finally spoke. His voice felt flat. He couldn't find his accustomed tone. "Hans, I think this falls on you. Can you provide us with your best guess on this subject? Perhaps sometime in the next few days. You seem to have let the genie out of the bottle, Hans. Perhaps you can re-bottle it."

They were all looking at him. Something was off-kilter.

"I think we must take Edward's hypothesis ---"

"Hypothesis? I think you mean wild speculation, don't you?" said Serber.

"I said exactly what I meant, Robert. It is a hypothesis. We must take it seriously until proven otherwise." He heard the anger in his own voice.

Hans Bethe spoke with barely concealed frustration. "I don't believe it for a single solitary second. But I will think it through."

"I think you had best," Oppenheimer replied but the nonchalance was gone. He found he couldn't look at them, as if he didn't want them to see what he knew was in his eyes.

"Now what am I supposed to do?" Bloch asked. How am I supposed to concentrate on a project that could mean the end of the world? We've already got a guy doing that in Germany."

"Agreed," said Serber. "Are you happy, Edward? You've derailed the whole damn train with your speculation."

"Hypothesis!" he nearly shouted.

Oppenheimer glanced briefly at Teller and saw surprise and worry in his eyes.

“Why are you looking at me like that, Oppie?”

Oppenheimer felt hot and agitated. He got up quite suddenly and walked out of this office.

He didn't know where he was. He seemed to be moving and far too fast as if some immaterial river were carrying him along. His awkward arms were no longer at his side or swinging up into his face with spastic precision. His enormous long legs, he seemed to have left them behind. He felt he might go under and drown in this buffeting current, only his long neck craned up out of the confusion, working to keep his head clear, but it was not clear, it was unmoored and lost and he did not know what he was looking at, was it some sort of hallway, and he did not know what he was hearing, voices was it, calling out “Robert”? Who was Robert? And this rigid grip of anxiety as if he were asphyxiating. He could not shake it, slip free of it, so he kept moving, heart pounding, struggling to breathe. Some death-like thing was after him. That was all he knew. And something had happened. Something was behind all this. Something that might condense out of a cloud and confront him with mortal danger. Until he realized he was sitting on a bench under a shade tree, his hands spread flat against the slats of the bench like two weight-bearing buttresses holding up the cathedral, an engineering marvel that owed as much to the collective common sense of the workers who raised her up as to the geometry and algebra of the masons who designed her. Now he remembered. Teller. Bloody Teller with his doomsday scenario. My God. He saw himself quite clearly now as if someone had thrust a photograph in his face as if he had glimpsed someone in a plate glass window as he rushed along the boulevard and shuddered at the image of this ragged, harried specter of a man peering back at him from the other side of the glass only to see at once it was his own reflection,

his own haggard, shaken self, this physicist, this presumptuous academic who was now playing with the fate of the whole world. He had already in so short a time as a few months gone from a curious aloof professor with a lot of leftie leanings, to a doubtful scientist intrigued by a problem of nuclear physics, hoping in his heart that this bomb could not and would not be, that they had read too swiftly in the book of nature and would upon reflection see that no such weapon could be built, to a dogged man with a difficult problem that must be solved by *us* before *them* if in fact it could be solved, to a hero of firm determination who had a herculean task set for him by the Gods, a task at which he must succeed, not for himself, but a duty that must be performed to salvage something of man's pride in this wicked world, until now he found himself enraged that Teller had stopped him in his path, that Teller had placed a stumbling block on his way to this holy bomb of his salvation, damn that ignorant bellicose man who threw up this catastrophic scruple that they might set the heavens on fire. Good God, Oppenheimer, look what you are now. You hunger after this bomb, don't you? You seek it with an intellectual greed, don't you? Stop. Stop. Get a hold of yourself. Get down on your hands and knees and pray that Teller is right so you can inform FDR and Groves and someone can get word to Heisenberg at Kaiser Wilhelm or wherever they have squirreled him away and all this deadly headlong rush to a million megaton disaster can stop just stop just come to an exhausted ragged end and we can get on with the killing of young men the way we always have, with the rich and powerful sacrificing all their children to Moloch and not involve the innocent and so easily misled men of science who belong in the quantum world of binding energy and electron shells and not in the world of warfare. Amen. All rise. *Gut yontif und sholom alechein.*

But Teller was wrong.

Bethe with his cartoonishly high forehead and mile-wide smile was waiting to begin when Teller breezed in. Bethe's mind was like a double-decker bus on the streets of foggy London Town. His eyes were like its headlamps piercing the gloom. Come on, fellows. Let's proceed. You can't have an execution without a neck. He found an empty chair and turned to Oppenheimer with his hands spread open as if to say let's begin, what are we waiting for? He saw Oppenheimer glance at Bethe. While Bethe gathered his wits, Teller asked them if they had heard Fred Allen on the radio. The man was a genius. He was telling his audience that they have now split the atom and everyone was wondering why on earth they did that and he said isn't it perfectly obvious, they did it because someone might want half an atom!"

Before anyone could laugh Bethe jumped in. "Edward, I commend you for identifying a very serious issue that has required my full attention these last few days. I think there is nothing we all want more than a clear warning from the gods that we have trespassed onto sacred ground where there are secrets beyond our ken and here we must not tread."

"Hear hear," Teller responded with all the bravado he could muster.

"I have examined your assumptions behind your calculations. They are quite telling."

"No pun intended."

Bethe sighed. He did not take the bait. "I tried to get inside your head, Edward, so I asked myself where would I begin if I, Hans Bethe, had come up with this idea of yours that we might set the sky and the ocean on fire with an atomic bomb. What would I, Hans Bethe, begin with as a probability for the nuclear instability of the elements involved? What would I begin with as the likely temperature that a fission bomb might achieve? And where would I begin in

estimating the energy loss from the x-rays that drive this scenario? I decided that I would start with a worst-case scenario for each of these items. I would begin with the highest possible probability of a nuclear reaction in U235, in plutonium 239, in hydrogen 3, nitrogen 8 and lithium 6. I would assume a temperature of three million electron volts created by the x-rays emitted by a fission bomb. I would assume the bare minimum energy loss from x-rays produced by such a bomb.” He paused for effect, the bastard, to let that all sink in. Teller could not decide where Bethe was going with this worst-case scenario or why, but he guessed it was a trap.

“And when I did all this, I found that even under these worst-case conditions, energy loss exceeds energy production and the nuclear reaction fails to be self-propagating by a factor of 100, that’s 1 followed by two zero. Even if you crank it up to the temperature within the Sun it fails by a factor of 60. Not even close. Not even almost.

Teller went still as a small animal that has sensed a predator, mortally still, as inwardly he shook with rage.

“And I ask myself, and I have been asking myself all this week, why did Edward choose such a highly unlikely scenario, such a worst-case scenario? Did he know it was outlandish on the face of it? Did he care? Did he simply want to give me some homework? Did he want to take control of the discussion? Did he want to show us the originality of his thinking? At any cost? Was this a roll of the dice, an all-or-nothing chance to set the agenda?”

Teller closed his eyes and clenched his teeth. He wished himself out of the room so furiously that he thought he might combust and blow away as ash and smoke. He could hear

their smug thoughts. Edward, you have safeguarded the oceans and the atmosphere. May they give you a medal and a promotion.

“Fred Allen, hunh? I love Fred Allen. Better than Jack Benny and I think Jack Benny is a very funny man,” said Serber.

“You surprise me, Robert. I didn’t know you had a sense of humor,” Teller replied,

Oh I do. I have a highly developed sense of humor. Do you know the one I like the best? The one about the mole hill man? Do you know that one?”

“It rings a bell.”

“The mole hill man is the guy who comes to work every morning and finds a molehill on his desk and it is his job to turn that molehill into a mountain. I don’t know why it comes to mind.”

Teller stared at him for a long moment. He listened as they all cleared their throats so they wouldn’t be heard tittering. “Yes, that’s a very good one, Robert.”

“All right, that’s enough of that.” Oppenheimer insisted on a free exchange of ideas in this meeting, but this was too funny and he was afraid he might laugh out loud and then they would think he was merely human.

Teller saw red, but no ordinary red. This was a blackened burnt red, the kind of red you might get from a communist battle flag on the streets of Budapest that had been set on fire and trampled underfoot by a ferocious crowd of rebellious thugs. He wanted to stomp on all their

smug heads. They were as dangerous to Teller as any armed mob of shouting gleeful murderous idiots firing their rifles into the sky. Instead he raised a finger in the air.

“Very well, then I shall return my thoughts to the Super bomb with continued resolve and may I remind you by way of a closing note that General MacArthur has put forward an island-hopping strategy that will bring the Marines and the Navy ever closer to Japan in such a way that he may minimize casualties in his War in the Pacific. He intends to leapfrog the heavily fortified islands and leave them isolated. The Super bomb could contribute to this economy as well. Instead of invading every other island as MacArthur envisions, we might simply drop a Super on every other island in the Solomons and the Marshall Islands, save money, save lives, save bombs.” And he walked out with as much swagger as he could muster.

Oppenheimer went after him and eventually caught up with him because he wanted to be caught, didn't he? What did he want, an apology? Did he want a medal? A commission in the Army officer corps? Teller would make one of those horror show captains. He would become a Custer. He would be more important than his troops. They would lose their lives because of him.

“Don't waste your breath, Oppie.”

“You know what, Edward? I have tried to like you. I continue to try. You have an original imagination. You see around corners. You see behind you. You have a sense of perspective that escapes mortal men. But Jesus you don't make it easy.”

“This is how you woo me?”

“I am not wooing you. I am asking you to join the team. This is a team sport.”

“And you are the leader?”

“I am asking you to follow my lead. You will get your day in the sun. You will get your chance for glory.”

“That’s all I ask, Oppie.”

Clearly the man had not understood a word he had said to him.

Chapter Eleven

General Goddamn Groves

Lawrence was seething. He had never seen Lawrence seethe.

“I do not want a union in this Lab.”

He had brought in a union organizer from the FAECT, a good man who did not shout, a gentle giant whose very size spoke of the dangers of union organizing, like a warrior in the Spartan Army where they threw out the runts by exposure on a crag. But that image was not remotely germane to the task or the union, the Federation of Architects, Engineers, Chemists and Technicians, not exactly a hotbed of workingclass rebellion.

“You don’t want your boys making a decent living wage? Is that it?”

“Don’t mess with around with me, Oppie. We do not need a union here. These guys are my devoted troops. I need them sharp and hungry. I pay them what I can. I got them all deferments for crying out loud.”

“You work them sixteen hours a day and you pay them fifty bucks a week. You ought to be ashamed.”

“You keep your commies out of here. Half your grad students are running around with the Communist Party. They are a political disaster waiting to happen.”

“A union is not communism. Unions are a part of America’s history, which you would know if you read it.”

“I don’t want a political lecture, commissar. Please. I don’t want politics in this lab. I don’t want agitation. I don’t want indoctrination. I don’t want espionage. A whiff of that I lose my funding.”

“Ford Motors has a union. What makes you so special?”

“You and your righteous indignation. You and your holier than thou.”

“They’re asking another fifty bucks, Ernest. Do the right thing here.”

“The right thing is we build a bomb. The right thing is we drop it on Hitler.”

“It’s not even your money! I could maybe understand it if it was your own millions they were chipping away at, but it’s not.”

“The hell it isn’t. I sweat every dollar in that lab. I crisscross the country. I beg. I plead.”

“Or do you butter them up to shake them down?”

“I swear to God, Oppenheimer. Whose side are you on here? You better make up your mind. You can’t have it both ways.”

“You doubt my loyalty? Is that what this is?”

“They come to me, you know, they ask me, what about this Oppenheimer, we think he is a risk. What am I supposed to say?”

“Who does?”

“You know perfectly well who does. These guys from the White House who are heading up this new project.”

“The one about –”

“Yes! Don’t say it. It’s top secret.”

“You’re supposed to say of course you trust me. Why wouldn’t you trust me?”

“You talk like a red, Oppie. You know you do. You’ve got half your class talking red. They do it because they worship you.”

“And your guys worship you. Don’t take advantage. Let them organize. Make a decent wage. Work a decent schedule. Hire a few more guys.”

“I scrounge for money and you give it away out of higher principles.”

“It’s a drop in the bucket.”

“It’s fifty thousand a year, Oppenheimer.”

“And your magnet is a million!”

“You make it impossible for me to promote you for this project. You really try my patience. Did you know we had some undercover guy from the FBI snooping around here?”

What?”

“He was evaluating our perimeter. I didn’t even know we had a perimeter!!”

“The ethical universe does not come to a halt for your cyclotron. There are rules of human decency here.”

“The ethical universe? My ethical universe is anti-Soviet and anti-Nazi.”

“You are throwing out the baby with the bathwater. The right to dissent. The right to organize. What does that leave, the right to make money hand over fist so it trickles down to those less fortunate?”

“Look, Oppie, I don’t care what a man thinks deep in his heart, but shut up about it when the FBI is around. And they are always around. We need you desperately. Don’t make it impossible for them to hire you. Compromise your ethical universe or I will have to disavow you. I will not be dragged down with you.”

“Ernest. Ok. You’ve made your point. And I’ve made mine.”

“We have bigger fish to fry. Have a sense of proportion.”

“I do. I will. I don’t need to tell you I need your recommendation.”

“Now you’re talking sense, Oppie.”

“Or is it appeasement? Peace in our time.’

“I resent that.”

“Ok, I’ll shut up. I’ll keep my counsel. I’ll live to fight another day.”

“Good man. Good man.”

But he suspected that he wasn’t. It was a compromise. It was practical. It was a tactical retreat. He could say it till he was blue in the face. But could he live with it? How was this the noble thing? This was where Izzy’s Talmud would have come in handy. A book that teaches you the questions but not the answers.

October, ’42

They had met. He thought it had gone well. Actually, he knew it had gone well. He was trying to like this Colonel Groves. Rumor was he was going to get his star in short order, this brigadier general to be, *Thane of Cawdor, King hereafter*. But Jesus the guy was a blunt smug hardheaded scowling opinionated sonofabitch.

Everyone had assumed Lawrence would be Groves' man. And Groves had gone to see Lawrence too. Lawrence had the latest of his cyclotrons up and running. The one in '39 looked like it was manufactured in the Emerald City, a hulking deco monstrosity. The latest one looked like the Death Ray of Ming The Merciless from Planet Mongo, very impressive and subconsciously military. Why shouldn't Lawrence be the guy to build the bomb? But here he was, Colonel Groves and his attaché Captain Nichols walking into his office at Berkeley and they stayed for two solid hours. It didn't take long to move past the pleasantries. Come to think of it there had been no pleasantries.

“Let me say right off, Oppenheimer, I just built the biggest goddamn building the country has ever seen, maybe ever will. And I brought it in under budget. Under budget. You hear that? I didn't do that being nice to people. I did it kicking asses. I did it breaking people's skulls. I did it by keeping that entire project in my head, I knew where every penny was spent, I knew where every brick came from, every design, every vendor, every contractor, the whole goddamn Pentagon from the bottom up, here in this head. And I am proud to do it. Every penny I saved is a penny we can aim at Hitler. Now you would think the goddamn army would be proud of me. You'd think they would pin a medal on me and give me a combat assignment. You'd think they would recognize a job well done and reward the man appropriately. But no. And here I am talking to a damn physicist.”

Then he settled down and started prodding and poking around in Oppenheimer's head.

“What do you know about warfare, Professor Oppenheimer? Do they teach that at the Ethical Culture Society? Do they teach that at Harvard? Cambridge? Göttingen?”

“Colonel Groves, my experience with warfare runs from the Battle of Troy to the Fall of the Roman Empire. I don’t know if that gives me a leg up on the United States Army.”

“You read Thucydides?”

“The Iliad, the Odyssey, Herodotus, Thucydides, Plato, Aristotle. Josephus.”

“College?”

“High School.” That should throw him.

“And what did you learn?” Nope.

“War is unpredictable. There has never been a war that went according to plan.” He was fairly certain Groves would not like that assessment. No one likes to be told his profession is overrated.

Groves took up the debate. “You know when the Vandals took Carthage, the Roman Empire had fallen but no one knew it yet. Rome knew it would go broke without North Africa. So Rome and the Byzantines joined forces and tried to get the Vandals out of Carthage. They threw everything they had at them. An enormous armada. But the Vandals caught them by surprise and burned their boats before they could land their armies. So what was the flaw in the Roman strategy?”

He liked the question. He hadn’t thought about Roman history in years. He sensed it was still at his fingertips. “The flaw was that they got into that impossible situation in the first place. The Vandals knew they were coming before they decided to come. You can’t sneak up

on Africa, Colonel. It was more like a suicide mission, a battle fought to save their honor, not to win back the empire.”

Groves liked that. He shifted gears.

“Let’s get down to brass tacks, Oppenheimer. You are a suspected Communist.”

He knew that was coming. But the punch was swift and caught him off guard.

“No.” Only say what must be said here. A smaller target as they say in the boxing ring. No chin.

“Don’t “No” me. Listen. I don’t care if your sister sucks Stalin’s cock. I know an idiot when I see one and you are not an idiot. So how do you explain that?”

“I’m done with the USSR. I’m done with all that. I’ve found a better way to save the world.”

“And what is that?”

“This project.” He lowered his voice and looked into Groves’ eyes. Groves, like radar, was scanning his skies for enemy aircraft. “I want to lead this effort. This is how I make my mark. This is how I repay my country.”

“That sounds good. Maybe too good. Why should I believe you?”

“Doesn’t that have the ring of truth? I am a man now. I put away childish things.”

Now don’t go quoting the New Testament to me. That kind of rubs me the wrong way. Isn’t the New Testament off-limits for your people?”

My people? Jesus. This guy had some small talk. “Christianity turned the Hebrew Bible into a prophecy of its own doom. That kind of rubs me the wrong way.”

“Let’s forget we brought it up.”

“Fair enough.”

“You know who is in charge of this operation?” Groves asked him.

“Only vaguely, Colonel.” Keep calling him Colonel.

“Army Counterintelligence. How’s that for a son of a bitch?”

“I don’t get it, sir.” Sir. Even better.

“It means they don’t give a damn if you can build a bomb. They only care if you are ‘sound’.”

“Sound?”

“Is he ‘sound,’ Colonel? We do not think he’s ‘sound.’ This is what they say to me.”

“They used to call a man sound if he had fifty thousand in cash in the bank.” According to his father. Before the crash.

“Sound on *communism*, Professor.”

“Oh I see.”

“I’ve got enough troubles as it is. I don’t even know what ‘sound’ is except that this is a poker game and ‘sound’ is the joker.

“You mean it’s their game, so it means whatever they say it means.”

“How do I make you ‘sound.’ Oppenheimer.”

“You want my firstborn?”

“If you had one, I would.”

“My reputation is my firstborn.”

“You sure you have no qualms? No reservations? No scruples?”

“Well I wouldn’t say it’s all black and white.

“The hell it isn’t. You live or you die. You win or you lose.”

“I am aware of that.”

“I believe that’s called a binary proposition in logic.”

“I think you mean a binary operator, Colonel.”

“Maybe I don’t give a damn,” Groves said, but he was aware that Oppenheimer was on his toes now, up off his heels, looking for an opening.

“Three years ago, Roosevelt said no bombing of civilians in this war and everyone said rah rah rah no bombing of civilians. Now we are talking about blowing up cities. Are you on board with that, is what I want to know.”

“It’s like they said of The Great War. You start out with the Geneva Convention, but you end up with poison gas in your lungs.”

“I was a cadet during that war. Got my commission on November 1st in 1918. War ended on November 11th. To my everlasting regret.”

He saw a chance to move in closer.

“If God had not created Marx it would have been necessary to invent him.”

“So you are a Communist,” Groves almost bellowed.

“You don’t have to believe in Marx to understand what created him.”

“Fair point, Oppenheimer. Fair point.”

Groves filled his pipe. Oppenheimer filled his own and waited for Groves to light his first. Groves’ tone became a bit less gruff.

“Tell me something I don’t know about this project, Oppenheimer. I’m not looking for yes men. I’m looking for a man who knows when I’m wrong. I know who I am. I’m loud and I’m intimidating as hell. So you have to really know you’re right to take me on. No maybe boys on my team. You give me the wrong dope I will tear you a new asshole in front of the whole Army.

Afterward when he played it all back in his mind, he wasn’t sure where the words had come from, only that they had come of themselves, possibly from a place in his subconscious mind where he had been secretly building the bomb for some time.

“You are going to need an army of scientists. You are going to need physicists who can elaborate the theory behind uranium fission and the mathematics of the bomb. You are also going to need physicists who can devise experiments to confirm the science, challenge the

science and generally feed the theorists with new experimental results. But you are also going to need chemists who can make the raw materials and on top of that you will need a whole slew of engineers who can actually build a bomb. That is a whole hell of a lot of scientists, Colonel.

He could see that Groves was chewing on that. All he managed to say was, “Yes. Ok.” From which he imagined that Groves was building the whole thing in his head, costing, requisitioning, hiring, hunting, surveying and whatever else Groves knew how to do as Pharaoh’s pyramid builder.

“Obviously the biggest division will be Chemical and Metallurgical. You are going to need factories to build your factories.”

“Say that again?”

“You are going to need a factory with ten thousand centrifuges to separate U235 from U238. But first you are going to need a factory to build the centrifuges.”

“Ten thousand?!?!”

“There is only one way to separate U235 from U238. Brute force. Tiny amounts over and over and over again.”

“Right. Ok.”

“You are going to need a nuclear reactor to manufacture plutonium. And you are going to need another factory to separate it from uranium. That’s four enormous factories with brand new untested technology. This operation is going to make the Pentagon look like an outhouse. You may need an entire state.”

“No, Oppenheimer. We are going to decide in advance uranium or plutonium. I cannot travel down two roads at the same time. That’s ridiculous. I will look indecisive. And wasteful.”

Again he didn’t even have to think.

“At Marathon, Colonel, the Greeks were outnumbered two to one. But they spread themselves thin so they could outflank the Persians on both sides. They figured one side or the other would get around the Persians before the Persians would bust through their line. They had to gamble. And yes they got lucky. But both flanks were turned and the Persians were wiped out.”

“Your history is apocryphal, Oppenheimer. The flanking maneuver was invented by the Spartans about three hundred years later.” Groves got up and went to the window. “But I see your point.” And then he said something remarkable. “You’re starting to really piss me off, Oppenheimer. That’s a good sign, isn’t it, Captain.”

“Yes sir!” he snapped.

“What else, Oppenheimer. Are you feeling lucky?”

“Colonel, you have research going on at Chicago, Berkeley, Princeton, Columbia and I don’t know where else.”

“We divide the research so no one knows the whole story. That’s Army policy.”

“But that’s your flaw. I want all my physicists in one lab. I want cross-fertilization. I want chain reaction. What you need is a spot in the middle of nowhere where you can bring all

these guys together where they can think their heads off in one place. They all disappear. No one knows where they went. And we don't let them out till we have a bomb. Run that one by your counterintelligence boys.”

“Maybe I will.”

“I think that would be wise, Colonel. It would be my only demand if I were to come on board.”

“I think I like this guy, Captain. He's making demands.”

“Yes sir.”

“Is there anything I know that you don't know more about it than I do?”

“Baseball, Colonel. Baseball is beyond me.”

“He's giving me baseball, Captain. That's very generous of him.”

“Colonel, I don't mean to burst my own bubble, but what about Lawrence? Isn't he your man? Or is he secretly a Nazi sympathizer?” What was the point of getting his own hopes up if Lawrence was going to swoop in at the end of the party and take the girl home?

“I am giving Lawrence serious consideration.”

Oppenheimer had one more story to tell. He hoped Groves would buy it. “When Galileo invented his telescope and turned it towards the heavens, he saw four moons orbiting Jupiter.”

“No kidding. I did go to grammar school.”

“Did they tell you in grammar school that everybody ran out and made a telescope and pointed it at Jupiter and nobody saw any moons? So Galileo invited the great thinkers of the day to look at Jupiter through his own telescope. They still couldn’t see a thing. They called him a charlatan, a blasphemer, a heretic. Libri, the great Venetian philosopher of the day, saw nothing and promptly died, and Galileo supposedly remarked that Libri had failed to see the moons of Jupiter from Earth but perhaps he would see them from heaven.” Groves made a noise that was somewhere between a laugh and a growl. “The fact is the instrument was incredibly crude. He saw only smudges of light and he decided they were moons. He spent hundreds of hours tracking little smudges of light in the sky with a heavy metal pipe that gave most men cramps in their hands and splitting headaches.”

“So what happened?”

“Johann Kepler threw his weight behind Galileo even though he had no telescope.”

“Why’d he do that?”

“Galileo’s moons confirmed his own laws of planetary motion.”

“What’s your point?”

“We need Lawrence where he is. We need his cyclotron to generate plutonium and U235 from uranium 238. Without Lawrence the cyclotron is just a hunk of steel. He is the brains inside that contraption.”

“You’ve got this all figured out, haven’t you Professor?”

“And I happen to know Lawrence doesn’t really want the job. He wants to build his 184-inch cyclotron. I want the job, Colonel. That should count for something, don’t you think?”

Groves did not make the offer. But he didn’t not make the offer. He left it hanging but he didn’t. If he could intercede with Army Counterintelligence. If he had the better hand to play. Unless the Army had something up their sleeve. If Oppenheimer had any friends in high places. If if if unless.

As Groves was making his exit he stopped and came back and said, “One more thing. Who would you have on this project if you had your pick?”

“Fermi. Szilard. Hans Bethe. Isidor Rabi. One of my grad students, a kid named Morrison. Teller. This kid Feynman at Princeton.”

“Yeah. Thought so. All Jews and Lawrence is not Jewish. You guys all speak the same language. You all have a particular bone to pick with Adolph Hitler. I respect that.”

“I appreciate your bluntness, Colonel. I don’t think I could assemble a more motivated group of people.”

“Whoever gets this job, it’s going to be a son of a bitch. It could break him. He might never do another lick of good work as long as he lives.”

Like Russell and his Principia, he thought. He would be ok with that.

“How much do you want it, Oppenheimer?”

“Like Icarus wants the sun, Colonel.”

“Piece of advice, Professor. Tell your communist friends they can go to hell. Tell them you don’t know them anymore and maybe you never did. Tell them if they want to us win this war for them, they should shut up about you and pretend you never existed. If Army intelligence intercepts one more cable to the Soviet Union with your name in it, you can go build a bomb for Stalin.”

“I have already done all that, Colonel.”

“And what about that woman?”

“Jean Tatlock?” Oh, he hadn’t meant to say that name out loud. Not for at least a hundred years. The words were fat and wet on his upper lip like the taste of her kiss. He smiled in spite of himself.

“Yes, that one.”

“That was a long time ago, Colonel. I am a married man now.”

“Where is she?”

“New York City presumably.”

“What does she know?”

“About physics? She’s a layman.” Ignore that pun. “About medicine? Quite a lot.”

“About you, Professor”

How to thrill him. How to humiliate him. She had been a hit-and-run artist. An unarmed robber. A second-story man who ransacked his rooms.

“Oh you mean what has she got on me?”

“If you will.” Oppenheimer took a moment to collect his thoughts. “You had to know this was coming, smart man like you. It’s not in Thucydides, but still.”

“It’s in Sophocles, Colonel.”

“Spare me the quote. Spare me the story. Just answer the question this time.”

“I would guess Army Counterintelligence knows what she knows.”

“Would she blackmail you?” He had no answer. “Would she sleep with you now? Would you sleep with her now?”

“Are you asking me if she would spy for the Soviet Union?”

“You’re goddamn right I’m asking you.”

“I suppose she might. But honestly, Colonel, I’ve had enough of Jean Tatlock to last me a lifetime. She was no walk in the park. I prefer to build a bomb and drop it on the Nazis. It’s more rewarding.” Jesus, talk ill of the dead, why don’t you. He would have to kill all his sympathies, especially Jean. And brother John who was a Party member. “Are they going to tap my phone and put a tail on me? Talk to everyone I ever met?”

“They already have.”

He was trying to remember the last time he had written to her.

“And your brother.” Jesus, the guy was reading his mind. “Your brother is a big fat security risk. “

“Yeah I suppose he is.”

“You are going to have to get paranoid, Professor. Suspect the worst of everyone. Trust no one.”

“I can do that.”

“I must be out of my mind. If I had another guy like you, I wouldn't be here.”

There was a long silence, each man deciding if he wanted to leave it at that. Groves had delivered his warning. Oppenheimer got the message. And the silence settled.

“I am going to catch hell for you, Oppenheimer. Holy hell. But I like a good fight. I'm looking forward to it.” Groves did a snappy about-face and was gone. Showoff. It was probably a habit, but oh brother. He heard Groves say something on the other side of the door. Was it, “Another fucking genius, just what I need”?

And then he realized he hurt all over. Like he'd taken a beating. No one blow had stunned him but the cumulative effect was punishing.

And he remembered what he had said.

Did he really want to touch the sun? Did he really want to build this bomb, this apocalyptic weapon? Was it that easy to give in to it? Which was worse, Hitler or the bomb? Between the two, would the world ever be free again? In chess they called it *zugzwang*. It's your move. You have to move a piece. But every move you can have makes your position worse. Every move leads to death and destruction, the capture of your king.

Did he want to be the Henry Ford of the atomic bomb? The Thomas Edison of Armageddon? He rehearsed old wounds and found the text was still fresh in his mind. Chadwick got his Nobel for the discovery of the neutron. Fermi got his for neutron bombardment and the creation of isotopes. Lawrence got one for his cyclotron. Bohr for his discoveries concerning atomic radiation and the structure of atoms, Heisenberg for his invention of quantum mechanics, Schrödinger and Dirac for pushing the mathematical boundary of atomic theory. God bless them all, but he had nothing. His ideas on stellar collapse had come to a dead end. He had not found the answer in the stars. But. He had built the best school for atomic physics in the world at Berkeley where he constructed theorists out of papier maché and bubble gum, where he manufactured experimentalists out of scrap metal and bald tires. Maybe this was what he'd been intended for. No, he didn't know how to wedge shivs of wood under a cyclotron drum like a matchbook under a table the way Livingston did, and he didn't know how to rent uranium by the gram like Szilard did. But there was a design forming in his mind for a temple that would house an ark of the covenant, a ritual home to a warrior god who would smite the enemies of his people, these pagan Canaanites of *die Nationalsozialistische Deutsche Arbeiterpartei*, who worshipped inferior gods in an almost sexual frenzy, who sacrificed children to their *Moloch* of racial purity, who were ruled over by their face-painted, heavily bejeweled, oiled and scented Bronze Age King, superstitious, purportedly immortal, who had enslaved his people for the baking of bricks to build his narcissistic mausoleum, who had starved them and broken their backs for his own false glory.

Something rose in his chest. He was on the verge of weeping. He had begged the man to let him build a bomb.

Groves skittered his way into Szilard's tiny monklike office in Eckhart Hall like Evil Eye Fleagle in his bright green zoot suit, fixed his gaze of Szilard and gave him a double whammy.

“ ‘The compartmentalization of information is the root of all evil.’ Did you write this?”

“I was referring to the practice in the Army of dividing up ---”

“Hey Mister. You got a problem with the Army?”

“I have a problem with bureaucracy and I have a problem with secrecy.”

“You got a problem with the Army, you got a problem with me”

“You got a problem with science, you got a problem with me, General.”

“Everywhere I go I've got Jews and physicists busting my ass.”

“The question is, General, do you want to build a bomb and win the war or do you want to be right all the time.”

“What the hell is that supposed to mean?”

“You've got four ways to separate U235 from U238. You have to pick one. You've got four ways to cool the nuclear reactors. You've got to pick one. That's two enormous decisions that have to be made by your million-man Army. If the man with the best science makes the

call, you're going to be ok. If the man with the most medals makes the call, you're going to be in deep shit."

"Listen to me, Mr. Loudmouth Leo Szilard. In the Army you do not question orders, you follow orders. That is the fundamental truth of the Army. You don't get that, you get a dishonorable discharge and you go home to mama."

"In physics authority does not count for shit. We are not medieval monks copying the works of Thomas Aquinas. We are trying to solve a new problem with new science. That is the fundamental truth of science.

"See, I don't trust you as far as I can throw you, Szilard. And I can probably throw you half a mile if I get real angry with you."

"You hired a bunch of engineers who don't know their ass from their elbow. Get rid of them. They are a menace."

"In a million years I do not understand a word you are saying.

"These idiots from Stone and Webster, they don't know which way is up on this project. I just sat through a presentation that was so ignorant and unprofessional it made my hair stand on end. I want them out."

"You got a lot of nerve telling me what to do. Who the hell are you?"

"I'm the guy who invented the chain reaction. Or haven't you heard? I've been trying to build this bomb for you for ten years, General. It's all I think about. I eat sleep and drink this bomb. I have spent every cent I ever earned on research and promotion for this project. I have

been yelling Hitler since the day he came to power and everybody said I was yelling fire in a crowded theatre. Well guess what? There was a fire. There is a fire. And after the war, there will be a fire the likes of which no one has ever seen. And somebody has got to be thinking ten miles down the road instead of only being able to see their hand in front of their face.”

“I’m sick of your second-guessing. I’m sick of your smart ass. I’m sick of your arrogance. I want you out. I want you out of this office. In forty-eight hours. Go back to Columbia. I don’t want you anywhere near the Pile. You are not reliable. You are not loyal. For all I know you are a German spy.”

“Oh that’s rich. That’s beyond ironic. I am the guy who has been yelling for secrecy at the top of my lungs.”

“You just said you were opposed to secrecy!”

“Within the project. Within it. Within the project we must have a free flow of information. Outside the project iron-clad secrecy. I’m the one who told Fermi not to publish. I told Joliot in France not to publish. I told Hans Bethe. I told Oppenheimer. I personally have refrained from publishing a single word so that Hitler and Heisenberg and all his loyal stormtroopers wouldn’t get wind of the bomb. And what happens? Everybody and his brother publishes their research on nuclear fission and uranium isotopes like it’s the Ladies Home Journal. Bohr and Wheeler put up a huge sign in Physical Review in ’39 **HERE IS HOW YOU BUILD A BOMB. ADOLPH HITLER, THIS MEANS YOU.** God in heaven, I would like to go back in time and strangle them in their cribs for doing this. They have betrayed us all! And now Hitler and his little toady Heisenberg have embargoed uranium. So what does that tell you?

They know all about nuclear fission. Who needs a goddamn spy when everybody is giving it away for free?"

But Groves wasn't listening. His inward eye was fastened on some picture of Leo as a suspicious character, something grainy and indistinct that one might see in a foreign newspaper, a surly face caught in a moment of rage amidst a street rebellion full of smoke and makeshift battleflags, and he was examining it minutely.

"You are an enemy alien, Szilard. Need I remind you of that?"

"You really know how to throw your weight around, General." Leo regretted this remark the moment the words reached his lips. Was he simply using a common American colloquialism or did he mean it as a direct insult to Groves' enormous belly? Possibly it was one of those wicked subconscious impulses that one lives for but either way he could see Groves' face go dark and still.

"That does it. I am going back to my office and write a letter to the War Department and have you arrested and turned over to the Army for internment till the end of the war. You can sit in a rocking chair and knit bombs on a back porch in Nome, Alaska for all I care."

"You let the scientists build the bomb, you will win the war, General, and you can run for President. You let the Army build the bomb and you will be on KP peeling potatoes for the rest of your life."

Fermi had been standing outside the half-open door listening for most of the yelling match. Groves hadn't bothered to close it when he blew in. He preferred to chew you out in

public. In private he could humiliate you. In public he could really humiliate you. Szilard was wondering if Fermi was going to intervene when he finally knocked politely.

“General Groves. I couldn’t help overhearing.”

“Come in,” said the General like it was his office.

“Come in, Enrico,” said Leo just to get his goat.

“Leo, I need you. You are indispensable to this project. But you have got to make an effort to curb your sense of injustice and get along with your commanding officer.”

“My commanding...?!?!”

“General Groves, Leo is in the midst of a very difficult and essential set of calculations for the next reactor.”

“You haven’t even got the first one up and running yet!”

“Leo is thinking ahead, General. The next reactor has to be designed to produce plutonium for the bomb. The calculations can’t wait. The design can’t wait.”

“You don’t even know if this thing will work!”

Yes I do. In all humility. I am certain of it. So I have asked Leo to take the lead on reactor design. I need him, General. You need him. The war needs him. He just likes to blow off steam from time to time. Don’t you, Leo.”

“Yes I guess I do. Forgive me, General. I was out of line. I am just a private in this Army. If I get excited it’s because this project means everything to me.”

“All right. All right. He can stay. For now. But I swear to God, Szilard. Don’t cross me. I am a vindictive son of a bitch. In case you haven’t heard.”

“Thank you, sir,” said Leo like he meant it. “You won’t regret it.”

Groves gave him the stink eye as he turned to go. “I still got half a mind to park you in Butt Fuck Podunk East Jesus Palookaville. And that is a mighty long way from here.”

Chapter Twelve

Critical Mass

December, '42.

You may not care to hear this from me, but this is my story too. You have to understand that the universe is an intelligent enterprise. Intelligence is everywhere. And that includes deep in the core of Chicago Pile-1 on December 2nd, 1942. You have to come to terms with that.

Down here on the quantum level everything is probability thanks to Albert Einstein and Niels Bohr and Werner Heisenberg and Edwin Schrodinger. Am I name-dropping? *Tant pis*. These guys didn’t describe reality; they invented it. I don’t want to get into a big philosophical discussion about it. You could just take my word for it. I have seen a thing or two. There are many many ways to look at the world on the atomic level. This is the one they created. So

anyway. I am here to tell you how this whole thing happened. Like I'm broadcasting it live as if I were on the radio. Ok, so I'm a neutron. Ok ok. Slow down. Don't get all bent out of shape. A more accurate way of saying this is that I am the probability of a neutron. I live inside an atom of radon-beryllium compound that sits in the dead center of the reactor core. I don't want to overcomplicate this thing. It's already complicated. I am just hanging out inside a beryllium atom. Me and four other neutrons and four protons and I suppose I have to mention there are four electrons whizzing about on the periphery somewhere. No I misspeak. These electrons are really clouds of probability. At any given moment they are somewhere in this cloud, but where *exactly* is not a legitimate question. Can you get a handle on that? It's kind of poetical in a technological way. A cloud of probability. Kind of like life itself. I'm getting off track.

Here in the nucleus things are very crowded. If this entire atom were the size of Terre Haute, Indiana the nucleus would be about the size of the boys' urinal in the country courthouse. Yeah, so picture that. So these four protons they all repel each other because like charges repel. Come on, you learned that in fourth grade. But there is another force in here holding us all in place and it's much stronger than electromagnetism, so they call it the strong force. You got a better name, run it by Niels Bohr. It's his department, not mine. Now I am not electrically charged, thank you very much. So this strong force is like a vise around my neck. I jiggle a bit but basically I am in a straitjacket in here. Not that I'm complaining. This is life. Maybe next time I'll come back as an organic molecule. I have heard of stranger things. I put myself in the hands of Enrico Fermi. I like this guy. *Paisan*, you know? A nice Italian boy. Did mention I'm from Brooklyn? I may be one lousy neutron in one lousy beryllium atom, but I was manufactured in a warehouse on the Gowanus Canal in Brooklyn. Parenthetically I shudder to

think what they are pouring into that canal from that warehouse and who is drinking what without knowing anything. I would trust Enrico with my half-life. That's a little scientific humor. What can I tell you? I've got an oddball sense of humor. This is what happens to your mind when you are embedded in a sphere of uranium and graphite waiting for the main event.

Now all of a sudden when nobody is looking a helium atom comes smashing into my nucleus where I hang out at a very high speed and what happens is all hell break loose. I mean you can do the calculations if that is your thing, but take my word for it, a helium atom is two protons and two neutrons and when it smacks into your nucleus you do a serious hurt dance. I should probably mention that this helium atom comes from the decay of the radon, so it's not like I wasn't expecting it. They painted a film of radon on a rock of beryllium. That was the whole point. But like I said, it's not a done deal, it's a probability kind of thing. So call me lucky. We got whacked with a helium atom and guess what happens. Did you guess yet? I'll give you another second. Ok, never mind here's what happens. The beryllium atom absorbs the helium atom and it emits a neutron. Me. I get emitted. I come shooting out of this beryllium atom which is now, if you think about it, a carbon atom because it's got two more protons and an extra neutron and beryllium 4 has become carbon 6. You can look this stuff up if you don't believe me. Or rather I fulfill the mathematical probability that a neutron gets ejected and now I am a wave of matter who's got his own probable location and probable momentum and I am probably whizzing away from this beryllium atom on a probable trajectory of some kind.

So what you have here is a dichotomy pure and simple. There is the ordinary world of cause and effect where you guys live. And there is the quantum world of probability where I live. And in between is no man's land. Don't ask me what goes on in there. It's over my head.

So now I am speeding away from the beryllium nucleus from which I was so rudely emitted and what's going to happen next is this. I am going to fly through empty space and if perchance I should bang into another beryllium atom I am going to pass right through it unless I make a direct target on the nucleus and then I am going to glance off it and keep going. And once I pass out of the lump of beryllium at the core of the reactor, I am in a whole new world made up of graphite (which is basically carbon atoms) and little round balls of uranium. And this is where things get interesting. Cause I am not alone. There are millions maybe even billions of neutrons like me spreading out in every direction from the beryllium atom where they got messed with in the first place and they are all zooming around in the pile.

Because I have no electric charge I can zoom past the electrons that protect the nucleus like I am Bugs Bunny and they are the tortoise. I like Bugs on account of I'm from Brooklyn too. I didn't actually see the cartoon but everybody and their brother is talking about it here. And when I say everybody, I mean the varsity football players who have been recruited to do the heavy lifting for the reactor pile. (Apparently, they did not stand up very well against the relentless ground game of their main rival Princeton this fall. I may be generalizing but everybody seems to think they are Princeton's main rival but Princeton thinks they are all a bunch of palookas.) The point I'm trying to make is that I can infiltrate the atomic structure without any kind of extra juice. I am not a proton that would be deflected by the electrons. Nor am I an electron that would be repelled by them. I don't need to be spun around a cyclotron like Lawrence is running out there at Berkeley in order to gain energy so I can go smash an atom. In fact, the slower I go, the more effective I am. Tip of the hat to Enrico Fermi for figuring that one out.

Now it is entirely within the realm of possibility that I zoom away into the pile and I evade capture, I do not bump into any uranium atoms and I speed away into the universe never to be heard from again. It happens. You do your bit for the cause but you do not make a dent. Think of all the doughboys that went over the top in Belleau Wood, got cut down by the Germans and never fired a shot. Yeah, a moment of silence for these guys, but you see my point. They also serve who only speed away unscathed. Like *sayonara* Chicago Pile-1 and *arigato* for the memories.

Because that is not remotely what happened to me. First of all, there is all this graphite. The pile is 9/10ths graphite and maybe 1/10th uranium. As I go whizzing past all these carbon atoms, I get sloooooowed doooooown. I was a fast neutron and now I am a slow neutron. Funny story, nobody on the team really knows why carbon slows me down. It was just a shrewd guess. But from my point of view, I bounced off carbon atoms like it was going out of style and each minor collision slowed me down like I'm a halfback and they are the defending linemen. So now I am a slow neutron. And lo and behold I smash hell-bent for leather into an atom of uranium 235. Not an atom of uranium 238, which is what 99% of this pile is made of. No, I smash into an atom that is of the tiny fraction that is uranium 235. See uranium 238 is stable. Neutrons like me we bounce off it. It is a nicely balanced atom and it cannot be messed with by a neutron. Like a guy playing gin rummy. He does not pick up the neutron that you put down. He stands pat. He may not be much at gin rummy but he may be very good at bridge. Uranium 235 on the other hand is about as stable as your drunken uncle at *seder*. (I have picked up a fair amount of Jewish cultural history in the Met Lab. It comes with the territory.) So now I'm living in an atom of uranium 236. I bumped it up from uranium 235. What can I tell you? I

look around and I'm thinking I had eight roommates in a little beryllium bungalow now I'm in a uranium bunkhouse with 235 protons and neutrons and I don't like this. I'm like a buck private in U Company. But this turns out to be a moot point because about three seconds later the uranium atom splits in two. One part barium the other part well it depends but usually krypton.

Now there are two upshots from this besides I get a major headache. When the dust has settled you have two smaller atoms that do NOT add up to an atom of Uranium 235. What is missing? I'll tell you what is missing. First of all, a couple of neutrons is what is missing. And second of all 200 million electron volts of energy in the form of gamma rays and heat. Where does this energy come from? It comes from the strong force that was holding the uranium atom together. Some of it gets away. Bye bye 200 million electron volts. And bye bye me! Here I go again. I am streaming away as one of a pair of fast neutrons. Hey isn't this where I came in? It is indeed. And once again I get slowed down by graphite in the pile into a slow neutron. And once again I smack into another uranium atom and it splits in two. And so does the other neutron, if we're being honest. I'm looking around in the general vicinity and the number of neutrons keeps growing and growing. And the number of busted uranium atoms keeps growing and growing. And you know, 200 million electron volts here and 200 million electron volts there. Pretty soon you are talking about a serious amount of energy being generated in the pile.

And this keeps happening over and over. Bing I slam into a uranium atom. Bam it disintegrates. Boom I am ejected into the pile. Bing Bam Boom. Bing Bam Boom. And then just when I am getting really high on all this high energy wackiness, I run slam into a cadmium rod and that is all she wrote.

For me anyway. Because I am captured by a cadmium atom which is well known to have a thing for free neutrons. Or maybe I should say cadmium can absorb a mad little neutron like myself without becoming unstable. So here I am now. I am a prisoner of war in a cadmium POW camp. If they torture me I will tell them everything I know. Not that it would do them any good.

But the war goes on!

And now when I look around it occurs to me that the war is not going well. I thought we were in this war to win it, but cadmium bars inserted into the pile are capturing neutrons everywhere and in spite of all our efforts we are not able to generate any kind of nuclear chain reaction you would be proud of. Instead of growing hot and then hotter and then dangerously hot, we are giving off a tiny glow. We have achieved criticality (thank you very much) so we could continue like this for several million years till we use up all the uranium 235 in the pile but we would be just breaking even. This is not what I signed up for!

Excuse me, one of my colleagues says, "More like several quadrillion years." I stand corrected.

We step onto the balcony above the squash court. It's big but it's crowded now with Fermi's control equipment and the measuring devices which will tell him when the reactor pile

has exceeded $k=1.0$ and more energy comes out than goes in. That will be the first moment when the power of the atom has been harnessed by the highest product of its evolution, the human mind and hand. Fermi and Wigner are already here. “Leo,” they say. I tip my hat. Ha! I am so nonchalant as if we happened to pass each other on the boulevard on any ordinary winter day instead of this monumental first day of the atomic age. It is beastly cold. It doesn’t get this cold in Budapest. Everyone is dressed for the synagogue in their second-best suit, hat and topcoat, but there are no prayer shawls, no yarmulkes. We do not daven by the wailing wall. We stand silent and proud before this huge squashed nuclear sphere of graphite and uranium ore held in place with timbers and concrete. The reactor has been tested and tested. We have built it up slowly but surely in increments of radioactive uranium and pure graphite, and when I say we I mean not me. I mean the Back of the Yard boys, hooligans and ruffians all of them but strong and desperately in need of a few bucks in return for some backbreaking work. Alderman Kusevitch had finally come around to our way of thinking and he had decided there might be a buck to be made on this project before it wipes Hyde Park off the map. The strength of the reaction is controlled by cadmium rods that can be inserted into the pile through tunnels carefully drilled by our Back of the Yard boys under the supervision of Anderson and Zinn and their Post-grad boys, who are more than a match for the Back of the Yard boys when it comes to arrogance and immaturity. (In truth the only sure-fire way to tell them apart was the way they speak. The local ruffians do not have the letter z in their phonetics. Plural nouns and third-person verbs that normally ends with a soft z sound end instead with a hard, unabashed s. Also the voiced th sound of these and those is replaced with a bright d sound. “These guyz” became “Deess guyss”.) These cadmium rods are actually 1 x 2 strips of wood to which they have nailed thin

sheets of cadmium. There is a doomsday switch made of a long rod of cadmium that hovers above the pile held in place with a clamp wired up to an electromagnetic switch. If Fermi's readings of radioactivity move beyond safety, they will send a signal to the device. The vertical rod will be released by the clamp and gravity will drive it into the pile and it will stop the reaction by sucking up all the free neutrons created by the chain reaction. There is yet a further safety device. Another vertical rod is suspended from a rope. In this case, there is no electronic device that might fail. Instead a physicist stands there with an ax ready to chop the rope in two and let fall the cadmium rod to thwart the runaway reactor.

When you think of physicists in history doing their experiments, you think of simple and powerful ideas: Archimedes sinking into his overflowing bathtub, Galileo dropping metal spheres from the Leaning Tower of Pisa, Newton under the apple tree, Faraday electrocuting frogs, Michaelson and Morley with their tabletop mirrors, Benjamin Franklin with his kite; but this is something more like the construction of a cathedral by the Order of Free And Accepted Masons. Try to imagine the fury of production here, as if God had only two days instead of six to make the world because He fears Satan will beat him to the punch. Hundreds of men have imagined, architected and calculated, rolled up their sleeves and constructed, jerry-rigged, finagled, cobbled together and carpentered, like Orville and Wilbur Wright raised to the power of Thomas Edison. The orderly chaos of their construction rising from the floor of the squash court involved a human hierarchy of power and control. Priests of the esoteric language of quantum mechanics spoke to the gods of nature and return with instructions for their peasant workers who dragged and carried and lifted and hoisted and hammered. There were odd touches of comedy. It was so cold the grunts were requisitioned raccoon coats someone found in a forgotten locker

under the stands at Stagg Field, relics of the Roaring Twenties. And the work went on night and day as if the Tower of Babel had a done-by date.

Can you understand how long I have waited for this day? It is as if I have personally dreamed this dream into existence from my epiphany in Piccadilly Circus to this moment when all the pieces of the nuclear puzzle come together at last. Ten years I have fought, argued, cajoled, wept, pleaded and demanded, doubting I would ever be heard, demanding that I must be heard, despairing, triumphing and despairing again, until the thing that was so obvious to me, so clear and present in my mind, finally began to dawn on my colleagues, until I had finally made them see the necessity of my vision, the cold-hearted logic of build or be built upon, of kill or be killed.

Forgive me. I am only in America two short years and my English is not so rootin'-tootin'. I show up around 9 am in the bitter South Side cold of that December morning. I am the master of ceremonies after all, the *capo di capos*, I Enrico, Mussolini of the nuclear pile. I have slept like a rock the night before. I am a cool cucumber. I stand with Wigner, Szilard and Herbert Anderson, my strong right arm, and about thirty other grandstanders. (I love this word), on the balcony., as I monitor the pile from two separate sets of instruments.

So what do we do here? You might say nothing. Nothing much is going to happen on a human level. There is no moving parts to be manipulated by the human hand. But we take two simple building blocks of the natural world, uranium ore and graphite and put them together ever so carefully to create a nuclear juggernaut. We simply arrange the raw material in a clever way based on detailed and painstaking study of radioactivity in its many forms. We take nature apart and put it back together more efficiently. We rebuild it, like a hot rod. You could say we turn a Tin Lizzie into a Duesie. Let us see how fast it can run. But let us not allow it to run wild. It would crash and burn and we wouldn't be here to pick up the pieces.

I order the cadmium rods to be removed in distinct and safe stages. Pull the rods out six inches or so and watch the radioactivity spike. When it levels off, pull the rods out another six inches and so on. My calculations predict every result like a champ. I hold my slide rule lightly in my hand, checking and rechecking. I feel like Glenn Miller with his slide trombone, such excellent music he makes, such style he has. The man can really swing it. Six months ago, I said there is no way to the bomb. It is pie in the sky. Chicago Pile-1 is a research project. Let them throw their money at me. Let them dream of incinerating Nazi Germany. It will take them 25,000 years to make enough U235. That was Bohr's number, and he ought to know. But now I see otherwise. Now I am swept along in their military fervor, but I do not want to unleash the atom. I want to harness it. And yet the thought of Hitler with the bomb enrages me. I can no longer pretend this is science and not war. And I am sick at heart at what I have become. By doing nothing but science I make their war. Do I stop where I am and walk away and leave the secrets of the atom for others to reveal? These are my secrets. I cooked them up in my skunkworks with my skunkworkers. (Can I say that, "skunkworkers"? I am not so sure.) I

cannot see past the evil that is Nazi Germany. Why here? Why now at this very moment when science and industry converge on the greatest leap since fire, why are we harnessed to this war machine?

Why do I let them take their plutonium and their U235 and do with it what they will? How ironic that I split the uranium atom back in '34 and don't realize it. I think I have created a new heavier element. They gave me the Nobel Prize. Now I got egg in my face. (That one I like because it makes no sense.)

At noon we hit a bit of a snafu. The reactor shuts itself down by mistake at .9k. We forget to raise the safety limit to 1.1k, we are dumbbells, so the cadmium rod that hangs from the ceiling like a sword of Damocles is released and shuts us down. I am now getting mighty hungry. I say let's put on the feed bag, boys.

Should I have given them back their Nobel Prize? Maybe they gave me the Nobel Prize for *not* discovering fission back in '34. If I did, everyone would have a bomb by now and we would be in a war of atomic weapons. What on earth would we have done? In spite of my knowledge and all my hard work was I not the sorcerer's apprentices who has lost control of his incantations and his esoteric recipes? Will my little bit of alchemy go berserk and destroy everything in its path?

Cause and effect versus free will. Are you beginning to understand that I work in mysterious ways? Lovely humble Niels Bohr is fond of saying that complementarity works on many levels. An electron is wave and particle at the same time depending on how you observe it.

He calls it quantum complementarity. A human act is determined by cause and effect and it is a result of free will at the same time, depending on how you look at it. That is complementarity on the human level. Can you get your head around that? Bohr said that if you think you can understand quantum physics, then you have missed the point. The same is true of human morality. If you think you can grasp it, you have not looked deeply enough at the excruciating predicament that is human life. Do you see a little more clearly the subtle beauty of my creation? Forgive the interruption. I see a teaching moment and I take it.

At 2 pm we go back to work. I looked at the pile, twenty-five feet across and twenty feet high and held in place with wooden scaffolding. It was going to be a perfect sphere in my plans but now it looks like we laid a radioactive egg. We build the egg up layer by layer checking radioactivity levels at the end of each day. When we have 56 layers I know that we are one layer away from critical mass. How do I know? I know in my fingers as they manipulate the slide rule. And I am right. Of course I am right. If I am not right the pile would sense what I want and make it so. We are *simpatico*, a human mind and a radioactive egg. We respond to each other's needs almost like desperate lovers. A million pounds of graphite. A hundred thousand pounds of uranium. And we do it in fifteen days. Even God does not make the world in fifteen days. He says he does. But I am dubious.

The Geiger counter begins to issue sharp clicks, a syncopated stream like Benny Goodman's drummer Gene Krupa, and then a steady stream and then a loud and then an almost deafening stream of clicks like locusts devouring the fields in Sicily. Shortly before 4 pm I

announce the pile has gone critical. We produce enough energy to run a flashlight, an atomic flashlight. I think maybe I smile. I wait a minute. Another minute. Everybody is holding their breath. I think maybe I will shout, "Run for the hills!" But Chicago has no hills, so instead I say, "Shut it down boys. We are done." Am I excited? No. Surprised? Not at all. Everything goes according to plan. How could it not? I put my faith in the numbers. I kid you not.

The guards outside the front door are stamping their feet and fighting the cold despite their raccoon coats.

"What's going on in there, Professor?" one of them asks as we wander solemnly out into the early winter night. "You guys having a party or something?"

Anderson mutters something about we are guarded by the BMOCs (the who?) with their hip flasks, tennis rackets and ukuleles, how they could break out into the Charleston any second. I think I hear him say, "Boop boop a doo, fellas. Twenty-three skidoo." But that's not really English, is it? Or maybe it is because they all laugh.

"Yes, that's right," I said. "A little gathering of friends."

"What's the occasion, Professor?"

I want to say, "Unto you a child is born," but I'm not that kind of guy.

Enter Szilard, solus.

He climbs down from the balcony onto the stage floor and seeks his light downstage center. When he feels it on his face he stops and looks skyward and to his left so that the whites of his eyes shine with stage light, an old actor's trick to steal focus from the other actors in the scene. Some do it shamelessly, relentlessly, so much so that they never look another actor in the face. But Leo is alone. He steals from no one. He is all there is to see. He strikes a pose and speaks.

I am no rogue, no peasant slave. To be

Or not to be is not the question now.

I am a man of science, I admit,

A man of many parts, not one of them

A soul. I know no heaven, nor a hell.

But this I will confess. The bubble

Reputation preys upon my mind.

'Twas I that turned the neutron to its task,

The chain reaction to its doom upon

This bloody tyrant Germany.

And now I have created black havoc.
Ignited dead metal to brief half-life.
I've plundered Nature in my fear of tyranny.
I say I am a man of peace but see
How I would have us study total war,
Bring us to the brink of vast catastrophe,
Carry into battle God's fierce ark
This columned desert smoke, this pillared fire
This God of War with whom I have no pact
But hatred of our common enemy.
I'd scorch the firmament with mortal flame
Incinerate the empires of the earth.
And terrorize the heart of every man.
This is the quiet inward voice I fear
Which speaks to me dark words I would not hear.
History be kind to this my psalm.
'Twas but my destiny to build the bomb.

Exit Szilard, sullen.

Teller thinks, I thought it would be more complicated, expensive, intricate beyond words, scientifically elegant, technologically triumphant cyclotron that would lead the way for the Bomb Project, but no it was Fermi's brute force reactor pile with its fifty tons of uranium just sitting there like a lump on a log. Where is the beauty in that? Where is the grandeur of any human endeavor in that? The only moving parts were the physicists running around taking its temperature all day long making sure it didn't blow Chicago to kingdom come and back again.

Call me 94. Call me P239. I have been called worse. I have been called Death. Not necessarily on purpose but my name, "plutonium," appears to be taken from Pluto the god of the underworld, the god of death. If you ask Seaborg, he will tell you, no, he named me after the planet Pluto because uranium is named after Uranus, the seventh planet and neptunium when it was discovered was named after the eighth planet Neptune, so Seaborg named me after Pluto the

ninth planet. Still I get a bad rap. I'm poisonous. I'm volatile. I'm explosive. I am the end of the world. I am Armageddon.

I need to get this off my chest.

About that word "discovered" as in "Fermi discovered plutonium." I was not "discovered" any more than I was "invented." If anything, I discovered Fermi. I was here before him and I will be here (which is to say nowhere and everywhere) long after his name is dust. I am not a gram of plutonium or an atom of plutonium or all the plutonium in the world. I am the idea of plutonium. I am, before time and after time, plutonium. If every atom of plutonium in the universe were packed into a bomb and fissioned into strontium and krypton, I would still be plutonium. And even if every atom of uranium 235 (which transmutes into an atom plutonium every once in a blue moon) were fissioned out of existence so no more plutonium could be produced "naturally",

I.

Would.

Still.

Exist.

A hundred trillion years from now when the last star has been extinguished and the pale glow of the white dwarf stars is the only light in a dark universe, each one giving off about as much light as the full moon on a clear night, I will still exist. (Are you listening, Robert Oppenheimer?)

Occasionally two neutron stars will collide and an explosion will ensue but that's a lot of sound and fury signifying nothing.

In a trillion trillion years, the white dwarves will become black dwarves.

Then the black holes will swallow all the black dwarves. Now we are a million trillion trillion years on. If civilizations of intelligent life are still around at this point, they might make use of the energy radiated by this phenomenon. Ironic that, living in the glow of a black hole instead of the glow of a sun. Like the yin and the yang. Perhaps evil will become good? Who knows? God works in mysterious ways. When he works at all.

And then the time will arrive when the universe is expanding so fast that it is expanding faster than the speed of light. Consider that. Objects on the other side of the universe will be speeding away so fast their light will never reach you. Your universe will get smaller and smaller. If there is a you to speak of.

Eventually it will be all just atoms in the void and then a trillion trillion trillion years from now the atoms will decay. Well. Nothing lasts forever.

It will be nothing but black holes and photons of light.

You may think it's all over now baby blue, but you would be wrong. The universe will be still young at this point. A trillion trillion trillion trillion years from now it will be all black holes, galaxies of black holes, all of them swallowing each other, the really big ones swallowing everything that gets within their gravitational reach. Eventually each remaining black hole will

contain an entire galaxy of black holes. There will be nothing left except gravitation and electromagnetism. Matter will be a thing of the past.

But. I. Will. Still. Exist. The possibility of plutonium. The idea of plutonium. Even though there are no minds around to understand me I will still be here. Which is to say nowhere, beyond time. I'm not saying it's a great gig. But it's what I've got. Plato explained all this. Kant elaborated on his system. But you are all too smart to understand Plato and Kant, you scientists.

And then in a trillion trillion trillion trillion trillion years even the black holes will die, evaporating away as radiation and then exploding one by one like one of your Fourth of July fireworks shows that lasts long enough to add twelve more zeroes to the clock and we're now a trillion trillion trillion trillion trillion trillion years into the future.

And there will be exactly nothing left except empty space itself and dark energy which is a little over my head. I don't know too much about it except it will go on forever perhaps. Or maybe not.

So please. Don't tell me you discovered me. You are of no consequence. Your chain reactions and your bombs are of no consequence. You have stumbled out of the muck and the mire of your planet and you have built a mudbrick civilization in the desert. You have enslaved yourselves to feed your gods and feather the beds of your high priests. You have terrorized yourselves into submission to them.

You call them scientists now and politicians instead of priests but who are you kidding? They make up their truths and use them to control your lives.

And now you have discovered the means of your own destruction. And you blame *me* for that? You give *me* a bad name? The bad name belongs to you. Your gods are sick of you. They are ashamed at your blind allegiance. They knew all along your civilizations were doomed and they might as well sit back and watch you destroy yourselves for their pleasure. They gave you the wit to build a bomb. But not the wit not to keep yourselves from using it.

This is unfortunate for me. For the vast stretch of eternity, intelligent life will not exist. I will have my work but I will not be admired or understood. A pity then if you choose to use the plutonium bomb to silence yourselves. I do prefer your presence, your participation in the idea of plutonium, to your silence. That may be a futile wish and yet I do so wish.

Having said all that, I would like to explain that this nuclear reactor that Signore Fermi built in Chicago was not a mere curiosity, nor was it simply a scientific experiment to prove something specific about the nuclear chain reaction of uranium 235. All that was well understood long before Fermi achieved his famous $k=1.006$ and the nuclear reactor began to generate its barely perceptible $\frac{1}{2}$ watt of energy in the form of heat and radiation. Fermi's nuclear reactor did something much more important at the time than split uranium 235 atoms into barium and krypton releasing energy along the way. U238 atoms seem to be the wallflowers of the dance. They do nothing in particular with regard to nuclear fission (unlike their kin U235) due to their admirable nuclear stability. But they have a weakness for neutrons that has been overlooked up to this point. Allow me to elaborate. I, plutonium, am created out of a process that contains a simple clarity, a natural precision that can be measured and modeled by physics but which also contains a beauty that can be *admired* by the human imagination.

While you are busy using streams of neutrons to bombard atoms of U235 in a block of uranium ore that is mostly U238, occasionally a U238 atom absorbs a neutron. Yes, it happens, although up to now this fact has been shunted aside in your rush to build a bomb. The result is U239 92 protons and 147 neutrons. This cauldron of atomic particles is not stable. It bubble bubble toil and troubles about for about 23 minutes and a half minutes and then a neutron breaks up into a proton and a highspeed electron, emits the electron as a *beta* particle and now it is no longer uranium at all. It has one more proton and one less neutron. It has transmuted into an atom of neptunium 239, 93 protons and 146 neutrons. Which is also unstable and lasts about two and a half days before one of its neutrons breaks up into a proton and a highspeed electron that flies away as radiation. And I am born as this fellow Trollope would say, P239 and I am made of 94 protons and 145 electrons.

Let me put it another way.



If you can't see the beauty in that, then you are not really looking. So please look again. Either way, that is the real point of Signore Fermi's Chicago Pile-1, to produce plutonium for a plutonium bomb. Fascinating is it not how your science is so often driven by your desire to murder one another in ever more efficient ways. I make no judgment here.

Chapter Thirteen

Los Alamos

Something told him don't answer that phone. Something about the way it was ringing reminded him of a fire alarm, and this would be the very last call he would take for god knows how long at One Eagle Hill in Berkeley. But his hand made the decision while the ringing went through him. He heard himself say hello with a hint of skepticism in his voice as if the caller might be in some sense illegitimate or unwelcome.

“Hi. It's me.”

She coalesced out of a cloud of probability into the hard, atomic fact of Jean.

“Oppie?”

He thought for the briefest second of saying, “No.” No, he's not here. No, it's not me. No, I really can't talk to you, Jean, ringing up out of the blue or more likely the black, he could tell from those few flat words that she was in a rough mood, on the day he was leaving for Site Y also known as Nowheresville, also known as You Can't Get There From Here. Damn that woman had timing. Could she sense the anxiety he felt in his chest, the shallowness of this breathing, the inability to concentrate, the excitement mixed with misgiving, the enormity of the job, the danger, the complicated weight of military and scientific duty, and at the same time the

pleasure at the thought of the long drive, chainsmoking, thinking, singing, daydreaming, the anticipation of the Sangre de Cristos, the snowcaps, the desert air, the scrub brush, horizon like the Pacific stretching in every direction as blonde as the sea is blue, the sun's heat liquefying the ribbon of asphalt that scribbled away into the distance, the enormous cottonwoods that rose out of the desert floor and spread out in the sun like homesteaders claiming the land in the name of hard work and family?

“Jean, is that you?” He almost said, “Is that really you?” But he didn't want to sound too surprised and certainly not pleasantly surprised.

“Hi, Oppie. Yeah it's me. Aren't you surprised? You don't sound surprised.”

“I am. Of course I am. It has been a while, hasn't it?”

“It has been a long time. Lotta water under the bridge. Under my bridge anyway. I won't speak for your bridge,” she said.

“Yeah? And how is the bridge doing?”

“If you mean me...”

“Yes, Jean. I do.”

“Oh well, that's a bit direct, isn't it? Bit of a direct hit if I may mix my metaphors.”

“I guess it is. I withdraw the question.”

“I just wondered how you were doing? I just wanted to hear your voice.” She stopped. He listened for her breathing, but she must have pulled the phone away so he would only hear silence. “Jean?”

“Yes, love. May I call you love? I know it’s a bit bold of me, but I’m asking your permission. You can say no.”

Could he indeed. Could he say, “No, Jean you may not call me love because it isn’t love anymore, is it?” It was more like the occasional hit and run there for a while, bit of a thrill, loud metallic crash of bodies, walk away with a few minor injuries, who was that driver, did anyone get her license plate? But not anymore. What in fact was it now? It was long distance, static on the line, this must be costing you a fortune. It was long silences while she wept or raged or if he was lucky laughed and rified on her Perils of Pauline love life.

“My darling Jean you may call me whatever it comes into your head to call me.” Oh, he was succumbing already. He was a pushover, wasn’t he?

“Thank you,” she said in a way that said, “You owe me that at least, you savage bastard.” “How’s every little thing, Oppie? I’ll call you Oppie, too, just to keep you off balance.”

He found he was calming down. The effort needed to concentrate on Jean was releasing him from the astringent ache that had been soaking his skin and shrinking it till it gripped him like leather.

“Well I tell ya, Jeanie, may I call you Jeanie?”

“You have never called me Jeanie in my life.”

“Not to your face I haven’t.”

She laughed a slightly pained laugh.

“Call me, Jean, my darling, my fastball lover, my breaking pitch to the head.”

“Is that baseball?”

“You know damn well it is.”

They both came to a halt. He saw and heard something like a ghostly montage of their turbulent past. He shook his head in wonder. “How did we survive all that?” he asked.

“We had some very good times too, Oppie, love. There, I’ve fused them together.”

“Jean, listen....”

No, Oppie, please don’t rush me off the phone. I need your help. I need to hear your calm reasoning voice. I’m really messed up good, love.”

“What is it?” He left off the “this time.”

“I’m so low, Oppie. I’m so damn low. I think I’ve hit bottom this time. I turn on the lights and the room gets darker. And I look around and I say what’s doing this to me, and I see so many evil things in my life, my work, my career, some guy who is just another version of you, the war, that goddamn bastard Hitler, that goddamn idiot Stalin, all the two-faced hypocrites in my life and I know they’re all bad for me, but if everyone and everything out there is doing this to me then it occurs to me it’s not them it’s me and I know what to do about all of them, but I don’t know what to do about me, Oppie. What do I do about me?”

She was weeping now, quietly, not dangerously, not out of control, maybe the kind of weeping where she would come out the other end feeling a bit relieved. That was one of her tactics. His heart was yearning with the old familiar yearn. She was like dry kindling that only needed a match and now he was staring into the roaring fire, mesmerized by the yellow flames, the redblack coals, the gray ashes.

He couldn't tell her where he was going or what he was doing. He couldn't even tell her don't call here anymore because no one will pick up. He had to assume his line was tapped from time to time. He wondered if Groves would listen personally or maybe glance at a transcript.

"Jean, hon I'm glad you called. I'm sorry to hear you're having such a bad time. I don't have any answers for you except to remind you there are good people in your life who love you and care about you. You are a beautiful intelligent person. I know you're going to make it."

"Beauty is my curse, Oppie. I ask a guy to hold me and suddenly there's a penis inside me."

Was she referring to him? Or men in general? Most men in general? He thought of himself as a gentleman, but she was overpoweringly sexual. She had to know that. Not much of an excuse, Oppenheimer.

"If that is meant to include me, then I am sorry."

"I'm not asking for apologies. Oh god. Sometimes I hate the sound of my voice. Why did you put up with me?"

You were an obsession, Jean, a compulsion. You looked at me like you would forgive me my carnal sins as long as I committed them on you. Was I wrong?

“Too late for post mortems, isn’t it?”

“I can’t make anything work in my stupid life and I sit here hating the sight of me.”

And then it came in an eruption of jagged gasps. He had heard somewhere that when a woman starts to cry that doesn’t mean the conversation is over. But she was weeping so hard she could barely catch her breath. He sat back down and lit a cigarette. He mentally revised his timetable. She needed a good cry. We all do. Well not him. He had never cried a day in his life. Murderous envy and poisonous anger had been his weaknesses.

“Jeanie, honey.”

‘Don’t call me that!’ She bellowed like the bull for the coup de grace.

“I’m sorry. I’m sorry for everything.” Strange how these apologies cost him nothing and came so easily in spite of the fact he blamed her.

“I don’t want your apologies!”

“Well what do you want?” He was losing his patience.

“I want your help. Help me, Oppie. Make me feel better. Wave your magic wand. Say something brilliant.”

There was a very long silence. He imagined she was so close he could kiss her through the wire.

“Ok, never mind. I’m wasting my time not to mention my nickels. I’ll let you go. You haven’t told me anything.”

“I’m up to my eyeballs in research. You know it wouldn’t interest you.”

“Stellar collapse?”

“No, that was a dead end.”

“Oh. That’s too bad.”

“I’m not really at liberty...”

“Really? Wow.” Suddenly she perked up. “I like the sound of that. I hope you’re doing something very important. I would be very proud of you.”

“I’m sorry, I can’t really...”

“Ok ok. I understand. Can we talk again soon? You’re so good to me, Oppie. You listen like most people talk.”

“Yes. Let’s talk soon.” What else could he say? No, I’m about to disappear in the mountains of New Mexico? I will see you after the war?

“Ok. Bye bye, Oppie. I miss you.”

“You’re going to be ok, Jean. You face things head on.”

“Thank you for saying that. That’s very sweet, I think.”

After a moment she added, “You know what I miss?”

“Tell me.”

“I miss sitting in the bath with you smoking cigarettes.”

“Yes. I miss that too. You know what else I miss?”

“Tell me.”

“The way you put your cards down when you have gin.”

“How do I put my cards down?”

“Like a child.”

“I am a bad loser, aren't I?”

“Sometimes you are a *very* bad loser.” But sometimes, oh god, sometimes she was a really good winner.

They said their goodbyes and hung up. He sat. What would she think the next time when the phone rang off the wall? And the next time and the next time and the time after that.

He had to beg Isidor Rabi to come to Los Alamos. He said, “I will build you a synagogue, you can be our rabbi, you will write a new book of the bible, *the Book of the Wars Of*

The Lord, and they will find it in the temple and they will rend their clothes and fall down and worship this book you have written. And I will learn Hebrew in order read it.”

“Oppie, you are referring to *Deuteronomy*?”

“Ok, I stand corrected, but we will call it *Uranionomy* because we will use uranium instead of deuterium.”

“Oh that’s good. You have linked deuterium to Deuteronomy. There is a Talmudist in you, Oppie.”

“Thank you I think.”

“Maybe you should call it *Plutonionomy*.”

“We will call it whatever you want but come, come to Los Alamos. If we succeed we are going to win the War for America.”

“Maybe so but right now I am a radar man, not an atomic bomb man. Radar has already made a big dent in this war, Oppie.”

“But Izzy.”

“If you really get stuck I will come out and have a look and do what I can.”

He took the train to Princeton. Feynman met him at the Dinkie in a white t-shirt. khakis and hightop sneakers, which did not matter so much as the fact that his fly was not zipped. His sneakers were not tied. He was out of breath, his cheeks flushed, his hair unkempt. He tried to

take Feynman to lunch at Lahiere's on Witherspoon Street, but Lahiere's had a dress code and the maître d' would have none of it.

"Seat us in the back where no one will see us," he offered.

"I will see you," the maître d' replied with a frost that seemed to cover them in rime. But he found a blue blazer with brass buttons hanging a bit loose at the cuff and Feynman snuck into it gracefully. Something of Feynman's animal magnetism caught his attention.

"I will allow it. Please be seated."

"Feynman, I cannot promise you there will be any women."

"Professor, please don't sweat it. When they hear where I'm headed, they will show up in droves."

"This is top secret, Richard. You will seem to have disappeared off the face of the earth."

"Let's not worry about it, Oppie." This whole project was so sexed up he got a hardon just thinking about it. He would fuck the local cactus if he had to. And the gopher holes if it came to that. Prairie dogs, they called them. This was how wise men went to war. He would wreak more havoc with a slide rule than all his fellow jewboys with their M-1 carbines.

"Do you sleep with all of them?" Oppenheimer asked.

"I don't sleep with them. I sleep on them, under them, in them, and all over them. But I rarely sleep with them."

This was only a game they played. Feynman was happily married now to the consternation of all. But his wife was sick with TB.

“Your wife will be fine. The air is especially good. There are several TB clinics. If that becomes necessary. I know it won’t. I just thought I’d mention it.” Where on earth did he get all this tact? He surprised himself on a regular basis. It was more satisfying than sarcasm by a good country mile. And he had been a master at sarcasm in his early days at Berkeley. It shamed him now to remember, but it pleased him to know it was now a thing of the past.

He didn’t have to beg Teller. Teller, in Chicago, was chomping on the bit. He got on a train as quickly as he could and stuck his Super bomb flag in the sand.

Serber was in Illinois living at the edge of a cornfield near the Champagne-Urbana campus. He didn’t know it when he left Berkeley but that bigot Birge had told Oppenheimer one Jew was enough for the physics department. As soon as he drove up, Serber knew what was happening.

When he arrived in Los Alamos in ‘43 it was like a cowtown on the Kansas prairie, the setting for one of those horse operas where it started out as a few mud streets with raised wooden walkways and a saloon where you could lose a lot of money real fast. Then along came the railroad and money poured into the town and made it grow by leaps and bounds. Except that the stock in trade of this wild west territory was not cattle or silver; it was the bomb. Oppenheimer pinned on his star and said “I’m gonna clean this town up so decent god-fearing folks can walk down the streets and raise their kids and go to church and everybody prospers.”

The Ranch School was a brooding piece of prairie architecture. It did not have the low sweeping grace of a Frank Lloyd Wright. It was a powerful square three-story building with a half-timbered façade, a second-story balcony and low rooflines. The small third-story windows peeked out from under the roof in a manner reminiscent of an East Coast colonial with eyebrow windows. It was forbidding and institutional on the outside. On the inside it was closer to an Adirondack lodge with stucco walls, timbered ceilings, large stone fireplaces and aging wooden floors that smelled sweetly of dust and decay. The Fuller Lodge was a log cabin design but large and airy with an immense central room that cried out for a pipe organ and a pulpit. The two-story porch was held up by round log beams that hinted at the architecture of a southern plantation. The Los Alamos Trading Post was right off the backlot at Paramount or MGM, like the Hollywood rendition of a wild west establishment. You might have expected an Indian in buckskin to be standing impossibly still near the doorway with his arms folded serenely across his chest.

They drove in from all over America, all of them stunned by the winding switchback dirt road that led up from the valley to the top of the mesa, like something out of a Bugs Bunny cartoon. They brought everything they had in the world with them to Los Alamos because no one had more than you can stuff into a car when it's time to move. Except for Feynman who bombed down from Denver on a used motorcycle while his wife took the Acheson, Topeka and the Santa.

The Army Corps of Engineers built a deep freeze here, an atom smasher there, barracks for the single folks this way, cottages for the married folks that way, a dance hall, a library, a radio station, laboratories devoted to physics, chemistry and metallurgy, construction projects

that looked like cockeyed jungle gyms and demented playgrounds. And everywhere were the sounds of hammering, riveting, engines revving, pile drivers thumping, men shouting and swearing, a holy din that reached God's ear high in his heaven. Would He confound their tongues and scatter their tribes to the four winds or did He have other plans for these foolish striving creatures?

Oppenheimer's office was in the Fuller House, not quite as spartan as his own ranch house in the Sangre de Christos to the east but he liked it very much. It was his sanctuary. Although it did not provide sanctuary from General Groves.

"Where is my goddamn organization chart? Nobody knows their ass from the elbow around here. I got a goddamn cyclotron being shipped in from Harvard. I need a foundation under it. I need a roof over it."

Groves was roaring and sweating and pounding on things. Oppenheimer wasn't impressed. What did he want, a proof? Differential geometry? A quadratic equation? The Pythagorean Theorem? The e equals mc squared for how to win an atomic war?

"You know, General, these things take a while. You can't just dream this stuff up while you're sitting on the crapper."

"Did you say crapper, Oppenheimer?"

"I did say crapper, General. Is that not the proper technical term?"

“Welcome to the Army, Mr. Oppenheimer. I think there is hope for you. But please, do you have the slightest idea how we are going to organize this project? This is not thirty-five scientists and a Nobel Prize. This is several thousand men and women going to war.”

“It has to marinate. It has to sizzle till it’s brown.”

“It’s not a lamb chop, Oppenheimer! It’s an organization.” Groves knew a lot about lamb chops but this was not the time for sarcasm.

Oppenheimer had not really given it much conscious thought. He had so much science on his mind. So many problems to solve. So many egos and ids to contend with. He picked up a pencil and as he was sharpening it he felt a deep calm settle over his wits. He wrote. Experimental Physics. His hand hovered over the page and then he wrote again. Theoretical Physics. And again. Chemistry. Metallurgy. And after a sigh he wrote once more. Ordnance.

“There you are, General. Five divisions. Theoretical Physics so the Gods are on our side. Experimental Physics because theory and a nickel will get you to Brooklyn. Chemistry, because physics is really just a blueprint for chemistry and chemistry will give us our raw material. Metallurgy because we have to build it and it’s not a hammer and nails project, it’s a forge and bellows project. And Ordnance because in the end it’s a bomb and we don’t want it to blow up over here before we get it over there.”

“Gimme that,” said Groves grabbing the sheet of paper. He looked at it for a few seconds. “Yeah. Yeah. Ok. Good.”

“And I will run the theoretical division.”

“You are the Director of the Laboratory and you want to run the theoretical division too?”

“I can do it.”

“And the cyclotron...?”

“Is Experimental Physics. I will put somebody in charge and you can yell at him whenever you feel like it.”

“I feel like it right now. I’m sick and tired of yelling at you. You’re too goddamn smart for your own good.”

Oppenheimer spoke to his assembled brain trust, the top rank of physicists. “Gentlemen,” he said, “we are here for a very simple reason: to put an end to war.” Polite applause scattered about the room. From the back of the hall Edward Teller raised his operatic baritone and said, “No, we are here to bomb the Germans off the face of the earth.” A moment of silence then a huge roar of approval.

Robert Serber had taken detailed, extensive notes of his summer conference in Berkeley so he told Serber to turn it into a lecture series for the hundred or so physicists, chemists and miscellaneous scientists who came to Los Alamos in April of ‘43. There was a library reading room in the building called the Technical Area. All the physicists set up shop in small offices in

this building. Everything had a name at Los Alamos. How would you know what or where it was if it didn't have a name? But the name was always a vague insubstantial thing that did not tell you what the thing was or where you would find it. Security meant you never called a thing by its real name. Goddamn Army could drive you nuts if you let it. Serber took the floor and began his sermon on the Good News, a state-of-the-art lecture on what had become the settled theology of nuclear physics. Like any good theology he knew it would all change. Doctrine would become heresy and heresy doctrine, but for now let us all take comfort in holy mother church. Serber called it Basic Bomb Theory. Sixty-four pages long, it was everything anyone who was anyone knew at this point about how to build an atomic bomb or a radiation bomb, or a nuclear bomb, whatever you wanted to call it because it had not been christened yet with its One True Name.

Reading slowly in a soft monotone, Serber began. "The object of this project is to produce a practical military weapon in the form of a bomb in which the energy is released by a fast neutron in one or more of the materials known to show nuclear fission."

He stopped to wait for it to sink in. He had just told the new recruits in so many words that their mission at Los Alamos was the building of an atomic bomb. A few already knew. Some had guessed. Many had speculated, wrong or right or somewhere in between. Some didn't really care because orders were orders and at least they were out of the shooting war. But when they heard it from the horse's mouth there were stunned into silence. How could they possibly assimilate the idea in the time it took to say it out loud and pause for effect. No one could do that. Some murmured a prayer. Some gasped with delight. Some banged on their laps and said they knew it. Some went utterly still with disbelief, some with dread. Some laughed.

A few felt the sting of a tear in their eyes. Heads went into the clouds and came down. Eyes went wide. Huge grins spread over faces. Faces cramped with concern and misgiving. Everyone drew perceptibly closer, as if a steel door had been slammed shut behind them and they would only fight their way out together. Good, that was exactly how he wanted it to begin. Well done, young Serber.

“We are not going to build this bomb in stages, gentlemen. We will not have sixteen midget bombs or almost bombs each one a bit more powerful than the last like Mr. Fermi did with his Chicago Pile-1. We are simply going to calculate the living daylights out of this thing, get it right the first time, build it and blow it up. Now here is what we know.” He began to expound on sixty-four pages of theory, formula, experimental results and hypotheses.

“Lesson 1. How much energy would be released per fissioned atom: 170 mega electron volts as compared with 5 electron volts in ordinary combustion. How do we know this? Oh we are clever. Follow my thinking here. Splitting two electrons apart we take the charge of one electron squared e^2 and divide by the distance between the two electrons R which would be the radius of the atom which is 10^{-8} centimeters. Splitting apart 92 protons in a uranium atom requires an energy equal to $92e^2$ since a proton has the same charge as an electron although it's a positive charge not negative. Let's 100^2 for simplicity's sake or 10^4 . And the radius of the nucleus is much smaller than the radius of the whole atom 10^{-12} centimeters as opposed to 10^{-8} centimeters. So our calculation is 10^4 divided by 10^{-4} because the nucleus is 10^4 times smaller than the atom. 10^4 divided by 10^{-4} equals 10^8 . That gives us a 10^8 as the size of a nuclear reaction as opposed to ordinary combustion. In other words a nuclear reaction is one hundred

million times stronger than a chemical reaction.” Amen. And a shiver went through the crowd like a brutal hit at a football game where the halfback doesn’t get up.

“Next up, the timing of the chain reaction, which we calculate will have only a millionth of a second to take place before the uranium core expands to a size which will shut down the chain reaction.” Serber calculated the number of atoms in a five pound lump of U235 and showed that you would need 80 generations of the chain reaction to fission every atom. “The energy released by a single generation of fission only becomes bomb worthy for the last few generations of the fission reaction. The question is can we reach that level of energy before the bomb blows itself apart and the chain reaction comes to a halt. We are pretty sure the answer is yes. And here is why.” Serber covered the blackboard with his calculations. He could hear ballpoint pens clicking and No. 2 pencils scratching on notebook pages as he chalked up the board.

He went on to describe the physics behind the creation of plutonium from U238 in a nuclear reactor. “So let’s be clear about this. The nuclear reactor gets its power from the fission of U235 into barium and krypton. But it gets plutonium from the transmutation of U238 into P239 by a two-step beta decay. So here the trick is to keep the nuclear pile from blowing itself up while it generates plutonium for a potential plutonium bomb.”

Oppenheimer stepped to the front of the room. “Gentlemen, let’s call it a gadget, not a bomb. I don’t want any of the workers on this site to hear the word bomb. Bomb is no longer a word around here. Call it the gadget.”

At the top of the meeting Groves had spoken darkly, ominously, profanely of the task ahead. He hadn't gone over very well. That he could tell from the steely, uncomfortable silence in the room. Tough luck, he didn't need their love. He needed their unmitigated discipline, their unbending obedience, their war readiness. In the nuclear chain reaction of his organizational mind he had seen (with Oppenheimer's help, ok ok, Oppenheimer, yes, who was in his head like some kind of voodoo, he only hoped it was good voodoo) that this project should proceed down two simultaneous paths, a U235 bomb and a P239 bomb and the U235 bomb required 3 separate paths of its own. In Oak Ridge, Tennessee he was building the biggest building the world had ever seen. Move over Cheops. Even his own Pentagon was being dwarfed. A gaseous diffusion plant with miles and miles and miles of gaseous diffusion sieves separating U235 from U238; a centrifuge plant with miles and miles of centrifuges separating U235 from U238 another more promising way; and an electromagnetic plant with a whole slew of "calutrons" (That was Ernest Lawrence's word, glorifying the University of California, that boy knew which side his bread was buttered on.) which would spin uranium gas around a modified cyclotron and separate U235 from U238 by their slightly different velocities creating slightly different paths along the route. 10,000 workers in makeshift barracks. No expense would be spared in the making of this bomb except for the expense of creature comfort. It's a goddamn war not a borscht belt summer colony.

Oak Ridge was also the home of the X-10 graphite reactor, the industrial-scale version of Fermi's Chicago Pile-1. This was no jerry-rigged, tinkertoy schoolboy nonsense like Fermi's Chicago thing, no halfbacks humping graphite on this site, no hoodlums from the stockyard, spitting and swearing, showing up late, sneaking out to smoke whatever those hoodlums smoked.

No handcrafted pile of uranium here, this one was bigger and better in every respect, a towering block of uranium ore, 50 tons of the stuff this time, combined with graphite to moderate the chain reaction, a fifty-foot wall studded with cylindrical holes, each hole containing a cadmium rod to fine-tune the energy produced by the fission reactor so that the Tennessee Valley didn't turn into a radioactive wasteland, and the damn thing was generating 500 kilowatts of power and they told him it might eventually generate 5000 kilowatts. It made its own electricity. But the whole point of this reactor wasn't to prove or tinker with the science of the thing, Fermi had done all that. Let them write all their scientific papers and put in for their Nobel Prizes when the War was over. He'd be happy to write them a recommendation. The point here was to create plutonium 239 from U238 and harvest it efficiently so they could ship the stuff off to Los Alamos, not enough to build a bomb, not anywhere near enough for that, don't get any ideas about that, but enough for the brain trust in Los Alamos to work with for the purpose of *designing* the plutonium bomb. Ya gotta design the damn thing before you can build it. They were dying to get their hands on the tiny flakes of plutonium that this behemoth produced. The whole thing had a clever modular design so that a chunk of fissioned uranium could be shoved out the back end of the reactor core and sent to the chemists for the painstaking process of separating the tiny amounts of plutonium that were created in the uranium ore. And then that chunk of uranium was replaced in the reactor by a fresh chunk of uranium ore that was shoved in the front end and the whole reactor kept on chugging 24 hours a day, seven days a week, irradiating a ton of uranium every three days, creating the atomic doom of Nazi Germany, atom by atom, flake by flake, grinding away implacably, ruthlessly, like a million-man army of infinitesimal battle-hardened soldiers advancing on the enemy, unstoppable, giving the General

an overwhelming tactical advantage against his unwitting foe. This was Groves' battalion, an atomic battalion at his command, the one that would win the war. Screw them all, Marshall, Patton, Montgomery, are you listening, General Eisenhower? His was the army that would win this goddamn war. And take no casualties.

Goddamn. It was fucking beautiful.

And at the very same time in Hanford, Washington a second industrial complex, the really big baby, the monster to kill all monsters was coming to life under Groves' relentless command. The B Reactor, the nuclear reactor to end all nuclear reactors. This one was going to generate 250 megawatts of energy, that's megawatts, with an M in case you weren't paying attention. It was 200 tons of uranium ore and 1,200 tons of graphite. This one would make the plutonium that would incinerate the *Wehrmacht*. Groves was going to personally see to that. Groves had harnessed the industrial might of the American economy. Fuck you, IG Farben. And fuck you, Adolph Krupp. You may not know it but the war is almost over.

Feynman and his wife had the second floor of a square woodframe house made of plywood and paint. Feynman was working on his pentuplets. The thing about the bongos was they really got your blood up. You might think, what these dinky little things? These itty bitty drums? But you would be all wet on that. Your hands began to glow with blood when you

really got going. When your wrists got strong they felt like iron. Your forearms felt like trees. Your palms were two catcher's mitts. He had one Benny Goodman album, just one. *Sing Sing Sing* was the track he loved. Man, that song could get up your ass in a hurry. Pretty soon the needle would be poking out the other end of the LP and playing the track on the other side, but in the meantime it was all BOOM boom boom, BOOM boom buh doom, budeedle DEEEE dum, budeedle DEEEE dum. How could you ever get enough of that noise? He had a way with the bongos of sneaking around Krupa's tom-toms that was pretty crafty and very satisfying. Pretty soon he was on his feet jitterbugging and lindyhopping and when he had worked up a decent head of steam he slammed the door behind him and charged off down Main Street and back behind the laboratory where he could really get some thinking done on this isotope separation thing which was the main order of business for his team. Some guys did physics with a pipe and a fountain pen. Not Feynman. He did physics with a Lucky Strike hanging off his lips while he talked nonstop to an imaginary adversary and gave him an earful.

Teller had the ground floor of this same matchstick home. Teller had a baby grand transported to Los Alamos from New York. Teller's lab was already in working order. Designed to handle hydrogen isotopes, it was meant for work on the Super. Let them all run around like chickens with their heads cut off building their uranium and plutonium bombs. He had his little kingdom of fusion research where he proceeded methodically and rationally to develop the weapon that would end all weapons. He was the last one up and the last one to bed at Los Alamos, except for the coyotes. Around midnight he would sit down at his Steinway and play Mozart, maybe Haydn, possibly a Bach fugue if the mood struck him, but mostly it was Mozart. He liked to play the fast ones slowly and the slow ones fast just to see what happened.

Mozart could take it. You found all things in Mozart. The baby slept through everything. To Piggily it was the background noise of nighttime, like the throb of the desert cicadas. To Mici it was of no consequence whatsoever. She slept like the dead, woke quickly when the baby cried and fell back to sleep in a moment. In the morning she would recall there was music in her dreams.

This kid upstairs with the drums was driving Teller crazy. The way he crammed five beats into a 4/4 measure was infuriating. He couldn't listen to it and he couldn't not listen to it. It sounded like a drunk driving an old Buick up a steep hill popping in and out of gear. You had to sit there and listen to see if the car was going to make it to the top.

The radio station was next door to the library in the Ranch School.

“Hello, Los Alamos! Can you keep a secret? This is Cottonwood Radio KYMI and KYRU, the home of existential jazz and the meaning of life. And this is everybody's favorite desert DJ, Richie F and the rest is silent. Coming at you from deep down in the underground, in the reinforced bunker of radioactive jazz and isotopic swing. We got the bebop noise for the rebop boys. We're gonna beat you daddy eight to the bar. All you hep cats with a five spot, all you doll dizzy dreamboats, all you jive bombers too, get your khaki wackys and get on the dance floor. Here comes a killer diller from Tommy Dorsey. Hot diggity dog!

“Is that you on the radio, Feynman?”

“Is what me on the radio, Mr. Teller?”

“That voice I hear, that madman. It sounds like you but maybe it’s just me.”

“That’s you on the radio?”

“No I mean maybe it’s just my imagination because that madman sounds like you, Feynman and that scares me that maybe we have a madman on this project.”

“You mean radio DJ Richie F and the rest is silent?”

“Yes, that guy. I don’t know what that means.”

“Well let’s see. Radio...”

“I know what radio is.”

“Ok so DJ, that means disc jockey the guy who plays the record albums on the radio because they are discs and he jockeys them back and forth. And let’s see Richie F, yes I see, that could be Richard Feynman like a nickname, right?”

“So it is you.”

“Well it could be me, but the rest is silent.”

“What is?”

“The rest of his name. It could be Feynman but he doesn’t say it out loud. It’s silent.”

“I am trying to take you seriously, Feynman, because Oppie yanked you out of Princeton and put you on this project so I’m impressed by that. But I don’t understand a thing you say when you are on the radio. I hope it isn’t code for something.”

“Code? You think it’s code?”

“No I don’t because I know you wouldn’t take the risk of betraying your country, would you, young man?”

“Are you gonna be trouble for me, Mr. Teller?”

“I don’t make trouble, but I know it when I see it.”

“You pound on that piano all hours of the night, if I may be so bold. I wouldn’t mind so much if it was Glenn Miller or Louie Prima but that longhair music gets under my skin.”

“I won’t dignify that remark. It comes from banging on the drums like an Indian.”

“The bongos are all-American. They are up there with apple pie and the home run derby. You’re the guy playing German music. I know Mozart when I hear it. I know Bach. Up keyboard down keyboard up keyboard down keyboard. It’s more like math than music. Maybe you’re the spy, Mr. Teller. What kind of code are you blowing?”

“You are incomprehensible to me, Feynman. Let’s keep it that way.”

“Did anyone ever tell you that you are the spitting image of Franz Kafka? It’s kind of unreal how much you look alike.”

Teller had never read Kafka but he suspected he was being compared to a cockroach.

This is Radio DJ Richie F and the rest is silent saying sayonara till the next time. You can call in your requests to me here at Radio KYMI and KYRU the home of existential jazz but we ain't got a phone here and neither do you! So drop on by if you're in the neighborhood. Or send us a note by US mail. If they don't censor it, we will play it!

Chapter Fourteen

Two Women

I'm not doing well. I'm really not doing well at all. This dry desert heat is not my kind of climate. Martinis evaporate in this climate if you don't drink them quickly. That is not a good thing. They need to be nursed. I walk him to the door as he grabs his satchel and heads for his office. I've become a half-native heathen. I grab a dressing gown so I won't be entirely in the nude when he opens the door. That would frighten the neighbors. I give him a peck. Then I give him a kiss. Then I stick my tongue in his mouth and give him a lick. It's like a wet hearth in there but I don't mind. It's like a distillery in mine. I'm all Kentucky sour mash and he's all Chesterfield Kings. I glance quickly at his face to see what's going on but I don't see much of anything. It's all hidden away underneath the orders of the day, which are considerable. To wit. Split the atom. Slay Hitler. Dethrone Hirohito. And if he's got a few extra minutes he can give

some thought to how he can bring Uncle Joe to heel. He's got a lot on his mind besides me. So I'll stay here and guard the fort. I'll stay here and drink. I'll stay here and go quietly crazy. I look up in the sky. It just goes on forever. There is nothing here but the sky. The only place that's got more sky is heaven. But this is not heaven. It makes me want to scream. I half expect to see the Wicked Witch of the West on her broomstick. "Surrender Dorothy". Or Kitty, as the case may be.

I ask him as he goes, "I'm trying to remember is there a comma after "Surrender" in "Surrender Dorothy?" He looks at me and he knows exactly what I'm thinking. Thank god for that. He understands my madness.

"I don't remember, darling. Which do you prefer?"

"I prefer it with the comma. "Surrender, Dorothy." It means she's telling Dorothy to surrender herself. Without the comma, it means "People of Oz, give me Dorothy. Sell her out."

He looks me right in the eye. Jesus how does he do that? I can't do that until I'm nicely insulated by gin and vermouth and a twist of lime. People have too much power over me. It's all I can do to fight them off until cocktail hour. Then I can take them on.

He goes sauntering down the dirt road to work, kicking up dust with his wingtips. God forbid they should pave the thing. They're all peeking at him from behind the curtains, all the ladies of Bathtub Row. They all want him. Everybody wants him. I used to think I was the catch, but he's got it all over me. Maybe it's just the nature of the competition. Most of these guys don't have the sex appeal god gave a newt. Maybe one or two. That poor kid Feynman whose wife is in the sanatorium in Albuquerque with TB. They say she may not make it. How

the hell does anyone die of TB in this day and age. And who the hell would marry such a person. He interests me. Sweet young kid. No, I wouldn't mind that one bit. I wonder if Robert was ever like that.

Susie and Elle and Madge come by around 2 pm for a game of bridge but oh god. Why can't I keep a civil tongue in my head? I think I'm being funny and entertaining but it gets ugly once they catch up to me with the martinis.

Madge said, "I think Enrico is a dreamboat, don't you?" I didn't know what to say. I watched him learn to dance over the summer at the socials in the mess hall. He sat there for three weeks watching everyone, practicing his footwork in a folding chair and then he got up and started dancing without a partner. Eventually Laura realized what he was up to and worked her way into his dance routine.

I said, "Jesus, Madge, you must be really hard up. I'd rather dance with an IBM 600, but maybe that's because I'm getting laid on a regular basis." I mean it sounded funny in my head. Or maybe they're all just a bunch of prudes. Maybe none of them are getting laid on a regular basis. I wouldn't be surprised. The hours these guys keep. It's insane. They don't come home till midnight half the time. And no one wants to nag for sex. BUT WHAT ELSE IS THERE TO DO AROUND HERE. Once you reach your limit, I mean.

And they will not stop talking about their children. Why do they go on like that about their children? I said, "Susie I think my kids are adorable too, but I keep it to myself for crying out loud."

She said, "Why are you being so mean, Kitty?"

I said, "I'm sorry, Susie. All I meant was my kids are adorable to me and your kids are adorable to you and let's leave it at that."

She said, "So you regret having kids?" See that was the alcohol talking. She would never talk like that without a couple of my martinis in her system. But she said it right in my face and I could feel my anger ignite."

"I don't regret having my kids, Susie. But I would sure as hell regret having your kids!" See? That's funny. I thought it was funny. Nobody else thought it was funny. What is wrong with people? They have no sense of irony. But it's not like they all get up and go in a huff. I think maybe I'm the entertainment. They like to see me let go even if I let go at them. They wish it was them. But it's not. It's me. I'm the one who gets angry and sullen and can't take a joke. They live vicariously through me. And then they can all go home and talk about me to each other. I am a very big topic of conversation around here. After the plutonium trigger. Oh yeah I know all about that. Robert confides in me. He asks my advice. I help him. I help him clarify his thinking. I soothe him when he's on edge and he is always on edge. He only has one speed, overdrive. Some of these ladies still haven't figured out we are building a bomb out here. Laura Fermi has no clue, none whatsoever. She thinks we are drilling for oil or something. Yeah Laura, but it's a very deep hole because the oil is in China. Ha!

How did this letter get here? By what witch's spell?

Robert,

Robert, please. Robert, where are you? I went to your house. There's no one there. The plants are all dead, I could see through the windows. Robert, are you hiding from me? Please, Robert, please. I must see you. I must be with you. I'm so down. I'm so lost. If you think this is easy for me to write you like this, you have forgotten who I am. You're the only one who ever really knew me, who ever really got me. Please come back and know me again. Please come back and get me again. I need someone good in my life right now. Tell me about no harm again, tell me about *ahimsa*, Robert, because I have been harmed. I am nearly broken. Can you see my wounds? I am so sick of this life.

I Would Say Love But What Is The Point?

Love. Love. Love. There I Said It Anyway.

Don't Make Me Say My Name. I Hate It.

Jean.

I Truly Hate That Word.

When she called to him like that, it echoed in his head. Like in the canyons when you can't tell where the voice is coming from, so how can you find it and come to the rescue? You ride around endlessly to no purpose. But she wasn't in the canyons. She was in San Francisco. If she says you're the only one who can save her, that doesn't mean you have to save her, does it? No, but it does. And he needed someone who didn't stink of the bomb, someone struggling

with the real world of men and parents and careers and alcohol. Did people still do all that? Nice to think so. So she was crushed again by life. Of course she was. That was her modus operandi. Be crushed by it. Be broken by it. And then come bursting back to life by some Wiccan spell. Did he really want to go through this again? The white-knuckled death grip on the rails of her rollercoaster life. Would she want sex? Would he want sex? He reminded himself of the humiliating ache he felt when it all went wrong and sex was like that game of touching the third rail. You could get a gorgeous jolt, but you could also get killed.

So he drove home to San Francisco to see her. He didn't write. Better just to show up. As he drove the concrete and asphalt two-lane roads that led through the desert to the mountains of Colorado, over the passes and down into the California farmland he imagined every scenario. Jesus she made him angry. Jesus she made him sad. And the angst ate him up around the edges for good measure. He would rather destroy the world in the name of defeating Hitler than have to save this woman and somehow save himself at the same time. He knew how easy it was to be drawn into her depression, the way the air felt sick in her room and he felt sick breathing it in, how she could crowd out all rational thought of any kind, work, play, even politics, how it all became emotion and need and longing up there in his head, how he would go around all day talking angrily back at her, Jean goddamn you, Jean why can't you, Jean I'm not going to, and then fall under her spell the minute he walked in her door, the look in those smart eyes, the cynicism in that frank laugh, the way she inhaled the smoke of her Pall Malls like a spell and exhaled it out of the corner of her mouth, the way her chin went up and her wrist fell, the cigarette straight up in the air accumulating ash, the way she leaned over and whispered in his ear and her hair fell in his face.

When he walked in the door of some friend of hers' extravagant, fussy apartment on Russian Hill, her face so pale, her eyes so sunken, the sad wince of a smile so strikingly, quietly demanding and hopeless at the same time, he realized he might still be in love. Her hand went to her mouth as she gasped in surprise. But it didn't feel like she was pleased to see him. That was part of her magic when the spell was on her. You merely walked in the door and you were besieged with feelings of doubt and shame.

"Oppie. Where have you been? I nearly went mad when you weren't in Berkeley. But at least I understood why you stopped answering my calls." she said. He could hear the struggle in her voice.

"Hello, hon. I have been driving for days. I'm really beat. I thought, just come, just show up. That's the best thing to do."

"Yes, thank you. It's good to see you. You've changed, haven't you? I can see you've changed. Where on earth have you been? No one seems to know."

Too many questions, so he asked one back. "Jean, what happened? Unlucky in love?" He shouldn't have told her he'd been driving. Everything he said could be a clue. He mustn't leave a trail of breadcrumbs. Not that she really cared a tinker's cuss about him right now. She was lost in her own story now.

"It's not luck, Oppie, it's preordained." So nice not to be a husband or a father or an arrogant man on a mission but to be an old lover. That was a role he could sink his teeth into. Why was she so beautiful when she was so poisonously sad? He felt an ugly urge to have her. He wanted to overwhelm her in her body and make an end run around her mind. That's what he

told himself, but really he just wanted her again in that paralyzed place where he had to but he could not.

“Why don’t you wash your face and hands and come sit down.” He was standing like a soldier waiting for his commanding officer to say at ease. He went to the kitchen sink and washed his face and changed his shirt from his valise. Cigarette butts and empties everywhere. At least there was food in the icebox.

“Come lie with me, Oppie. I need a warm body. I’m half dead with solitude.”

He lay down with her on the scotch plaid sofa. Her scent was all over it, that sharp scent of confusion, desperation and weariness. Her hair was long and messy and matted to her forehead. She cried in his arms and asked him if he still loved her.

“Of course I do. I love you up one side and down the other.” Which made her laugh in spite of herself.

“No you don’t. But maybe a little?”

“It was never a question of love, Jean, you know that.”

“Oh god I’ve made such a mess of it.” Somehow he knew without knowing why that she had got pregnant and had to put an end to it.

“You got it bad?”

“You ever have that dream where you’re underwater and you’re trying to reach the surface and it’s up up up, how far up is it, I’m not going to make it, and you can’t seem to get to the surface?”

“No I haven’t.”

“Well that’s what it’s like.”

She talked about New York. She talked about medical school. She talked about some guy on the train, there was always some guy on the train, in the bar, at the dinner party, in the elevator. He felt himself falling asleep in her arms. When he woke she was standing there wrapped in a quilt. He had been dreaming of driving in the hot sun. “Please come to bed with me.”

“I don’t think that’s such a good idea.”

“I need you.”

“I’m here.”

“in bed I mean.”

“I think that might be the last thing you need right now.”

“The way you do it when you’re soft and gentle.”

“Is that how you remember me?”

“Come on, Robert, you’re stalling. I hate that.”

“I think this is could backfire, Jean. You know? Like the doctors say. First do no harm.”

“I don’t need a goddamn doctor. I’ve had enough doctors to kill a horse.”

“Oh come on, Jean.”

“The idiot said I was a schizoid personality. I said, you moron I’m a classic manic-depressive. Don’t you know anything? He tried to put me in a sanatorium!”

“Oh no.”

“I never would have got out of there alive.”

“You’re exaggerating.”

“So. I’m exaggerating. I’m sick. I need you. Thank god you came. Now make yourself useful.”

“You want me to do the dishes?”

“Screw your sense of humor, Robert. It is always at my expense.”

“What do you want from me. I’m here. I’m trying my best.” His cognitive functions were already eroding, the rational act giving way to the angry impulse.

“Forsaking all others, cleave unto me.” She turned to the bedroom and looked back over her shoulder. “Or we could just lie together and imagine it.” It was a plea and a defiance at the same time, which made him remember how young he had been and defenseless against her tactics when they were first going out. “Come on, let’s just get it out of the way.”

It *was* in the way, but he hoped in a good way.

She knelt down by the sofa and tried to unbutton his shirt. He resisted. Which hurt her, he could see that, so she smacked him.

“You coward. Marriage has made you a coward?”

He shook her and said, “Stop it.” How could he be doing this?

“You bastard. Are you too good for me now?” She made a fist this time. He had to grab her arm. He didn’t want to get angry but he could feel the fuse burning down. She shouted her ugliest accusations, the ones that usually followed him out the door when he was slamming it behind him. He muttered his back at her, under his breath but within her hearing, that infuriating pretense at detachment which was his rare kind of cruelty.

Her volcanic anger gave way to weeping. Weeping gave way to a desperate embrace.

It wasn’t two passionate kids anymore using sex to barricade themselves against the world. It went very deep. She didn’t hide her ill will. She didn’t hide her tears. She didn’t hide much of anything. She dared him to look at her and still want her. Maybe she knew how compelling that made her. Maybe she just didn’t care. He let her see his rage and his shame, his disappointment with her, with himself. It was dangerous like there was a stick of TNT in the bed beneath her that could blow up in their faces and splatter them all over a wall.

Afterward, he drifted in and out of sleep feeling the mental and physical relaxation and only a tinge of misgiving. They smoked her Pall Malls and started in on his Chesterfields. They ate everything in the icebox. They gossiped. And just when he thought it had done some good, she started crying again.

“Oh god I’m useless,” she said. She curled up and wept and bristled when he tried to touch her. “Get away from me, can’t you? I can’t breathe when you do that. Why did I do that?”

What is wrong with me? Why can't I get it through my thick skull? This must be what dying is like." She disappeared into sleep. He went for a walk in the quiet night but his head was shouting at him.

When she woke she was peaceful. Her eyes shone. There was a questioning smile on her face. "I feel better. I feel like I've given birth."

He could tell she wanted him again. She was endlessly optimistic in spite of herself. And he was endlessly pessimistic, meaning he just might say yes. She was still fragile as glass. He tried to go gently.

"You want to tell me what happened?"

"No, I don't think so. You can probably guess." But she did. The guy, the affair, the good times, the craziness, the deceptions, the truths, the sense of hope giving way to the sense of doom. She didn't say he was married, but it was apparent. She said he was a captain in the Air Corps.

"Captains are a dime a dozen, Jean."

"Now he tells me."

"Oh come on, you know that."

"I do, but I didn't care. And I got pregnant. How stupid can you get?"

They fell silent. She held him tightly like letting go would mean being swept out to sea. This girl had a knack for sadness and catastrophe that astounded him.

She asked him again where he had gone.

“Don’t ask me that, hon.”

“Oh yeah? Something to do with the War?”

“Not really.”

“Not really? What does that mean? Are you being cagey?”

“No but I really don’t want to talk about it.”

“I have never heard those words come out of your mouth since I met you.”

“Everybody you meet these days, tells you they are doing something important for the War. I seem to be the only one who is willing to admit I’m not.”

“This humble side of you, it’s not very attractive.

Her persistence was unnerving. What did she really want?

“So what do you think, Robert? Am I a basket case”

How was a man supposed to answer that question?

“You are the most beautiful manic-depressive the world has ever known. And when you’re back on your feet and you get that ecstatic thing again, which I know you will, you will shine like a second sun on the avenues of Manhattan and men will fly too close and their wings will melt.”

“Did I melt your wings?”

He didn't feel like answering that one. Wasn't it obvious?

"How long can you stay?"

"Only the day."

"Where are you going?"

"Back."

"You're being so mysterious. It's not like I'm going to follow you home, you know."

"I know."

"I just want to know what you're up to. So I can believe in you again."

"Please let's not talk about your disappointments with me and the Left and the Party and all that."

"Because there is all kinds of talk about you, Robert."

"What kind of talk?"

"Some deep dark secret."

"There's no deep dark secret."

"Is it so important you can't tell anyone?"

"You want me to make something up, like a bedtime story?" He knew he was being tailed. They would probably tap this phone when they realized it was Jean Tatlock he was seeing. It occurred to him she would believe anything he told her. He imagined some spook on

headphones listening to Jean telling someone in the Party that Oppenheimer was working on an invisible bomber or a giant walking electromagnetic tank.

“I want to hear about your wartime exploits. I want to believe you didn’t give up the fight to make war profits for the industrial bigwigs.”

“You know what I’m asking myself right now?”

“No, what are you asking yourself right now?”

“Are you just curious or did someone put you up to this?” He knew it was going to cost him, but it had to be said. He could see it go up her spine.

“Oh so you think I came all the way from New York and all this is pretending to get you into bed so you will spill your secrets?”

“That’s what I’m asking myself.”

“Well fuck you, Robert. So much for the humble side.”

That was maybe the dumbest thing he could have said. Now she had to think there was something going on, something secret the Party would want to know. She got up and stomped around the room.

“All the way back on the train I was thinking Robert will set me straight. Robert will sort me out. I may hate him for it, but he owes me and he can take it.”

“I don’t owe you, Jean. I care about you.”

“You sure you didn’t just want fuck the sad girl ‘cause she said please and you could really feel like a man again and pretend it was all her fault.” Like a good boxer, she drew him in close so she could really land a punch.

“Ok I get it. You wanted me back so you could punish me some more. Why didn’t I see that coming?” He entertained the possibility that this was some sophisticated ploy that someone had dreamt up to get him talking about the Project. Sex and guilt and rescuing the maiden would turn his head, make him feel important and he would spill a few secrets while he was feeling his oats. No matter what happened between them, he knew they were going to haul him in and grill him about this trip. Why did you go? Who did you see? Where else did you go? Who else did you see? Did anyone approach you? Why did you really go? Why, indeed. He was reminded again that when it comes to understanding our own motives, the philosophers say we have a privileged access to our inner lives, and only we know why we do what we do, but the psychologists know our view of ourselves is fatally compromised and we are often the last to know who we really are.

As he was gently but persistently making his exit, hoping he could keep his cool in spite of the accumulating pain, she said, “Did you really think you could do it in a day? You overestimate yourself, Robert.”

“Yeah, I’m an idiot. But that’s the least of it.” He stifled his grievances. He would get no satisfaction here.

“It occurs to me,” she said, “if you really spend your life doing no harm, you probably don’t do much good either.”

“It’s a goal you aspire to. And it doesn’t work unless everyone is in.”

“And when will that ever happen?”

“It could happen here in this room between you and me. That would be a start.”

“But you went and got married.”

“So I guess you are doomed.” He hadn’t meant to say it like that, but she had worked her magic on him. She had made him feel useless and hopeless, utterly without merit.

He stood in the doorway looking back at her. She stared at him. She was hiding her thoughts. This should be a lesson to them both. Too much water under the bridge. He would always be waiting for the next drenching downpour even as he was hoping for the fireworks.

“Do you ever wish there were no such thing as sex?” she asked.

“Yes. And maybe then we would do no harm.”

“But the world would come to an end.”

“I suppose worse things could happen.”

“That’s got to be the blackest thing I ever heard you say.”

And he was gone. Back to Los Alamos.

So many ways to bring the world to an end.

And yes it was love. Would they ever be done with it?

“How was your trip,” I say as innocently as I can. He looks like hell. He is covered in dust from the road. His hair is a fright wig. He’s got a raccoon tan from the sunglasses.

He was still in Jean’s world in spite of the long drive or maybe because of the long drive. How long can you live on one night in bed? It would depend on the night, wouldn’t it? So that could explain why this one was still with him after two days on the road. Or more to the point, how long can you live on an old flame when she flares up out of nowhere. He was grateful for the time off from the bomb, but really she was a kind of bomb too, wasn’t she, a ticking time bomb he could only defuse temporarily.

“I interviewed the guy. He’ll do nicely. He’ll be down here as soon as he can slip away unnoticed.”

“And who else did you see?” I’m not even being cagey. I’m just being polite. For now. He can tell me or he can not tell me. And I will respond accordingly.

“I didn’t see anyone.”

“So you did it with your eyes closed?”

He laughed in spite of himself. She had always had a caustic sense of humor. That was the first thing he noticed about her. But it still caught him by surprise how she flirted with danger.

“Did what?”

310

“Spent the night with Jean. Made love to Jean. Had sex with Jean. And fucked her once or twice for good measure.” I am really spoiling for a fight. This is how we say I love you in Los Alamos.

“Jean is in New York. I didn’t see Jean. And you know I detest that word.”

“Darling, you rushed out of here like a sailor on leave. Maybe it was Betty Grable.”

“I am not a sailor.”

“Oh yes you are. And you swear like one now that you’re in the army so don’t tell me you detest that word.”

“There is an enormous difference between fucking as an adjective and fucking as a verb.”

“Well you might as well have fucked her because everyone assumes you did. In spite of the fact that the FBI and the OAS and Army Counterintelligence and maybe even the Gestapo and the NKVD are falling all over themselves to tail you and tap your phone and interview everyone who breathes on you from a distance.” I am really on a roll now. Sarcasm rolls off my tongue. I am bright with it. “So tell me what is this enormous difference? I tell you you are committing adultery and you give me a lecture in philology, you ass?”

She had an appetite for conflict that he could not begin to match. She would shred his battle flag with rifle fire and then shred his white flag of surrender. He had toughened over the few years of marriage. He was proud of that. But he couldn’t meet her head on. She had an unfair advantage. She liked her anger. He didn’t like his. He didn’t like to lose control.

That she even knew the word philology.

“Philology I know. Adultery I do not,” he replied evenly.

“I’ll have it chiseled into your gravestone. Philology he knew. Adultery he knew not.”

“You need a drink, don’t you?”

“Maybe I do.”

“Maybe I’ll join you.”

“She wrote you a letter. You didn’t even bother to hide it.” If I could punch him in the face I would, but this will do.

“I did bother to hide it.”

“Yeah well you left enough clues for the whole armed forces.”

“You would have had to really dig around and ferret it out. Did you get a kick out of that?”

“Are you making a drink or do I have to make it myself.” I grab the bottle and the shaker and I get to work. I make them as well as he does, although he gets all the glory on that score.

It hit him quite hard how like Jean she was. Demanding, vulnerable, accusatory, fragile. She was the 80 proof Perils of Pauline in a freight train going off a cliff. How did she get herself into these dangerous situations? How did she get herself out? Why was she so goddamn entertaining? When would she run out of tricks? All this in the space of time it took her to add too much vermouth. He sighed. Choose your battles. If they were making martinis it couldn’t be all that bad.

“If you really read it you would see she was despondent.”

“That never stopped you.”

“Are you talking about us now? Our sex life? I can’t keep up with you.”

“She said, come to me Robert, come see me. She wouldn’t say that if she were in New York. And you wouldn’t drive off like a bat out of hell. So don’t tell me you didn’t see her, you baldfaced liar.” He’s going to drink that thing and pass out. I can see it in his eyes how beat he is. I have a deadline here.

He would hold her off as long as he could, but he could already feel his forehead getting thick with sleep. One good martini and she would be silenced.

“I love you Kitty. I love you very much. I will defend to the death your right to petition me for redress of grievances, but face it darling I am not King George, I am not the source of your unhappiness. I am just the target. You may say whatever you like. I’m just going to close my eyes and listen. Go on, I’m listening.”

I could smack him. I could cold cock him right here in the kitchen. But I don’t think I will. He has an unfair advantage. He’s asleep. Oh god, when will we ever get out of this hellhole. Not until he builds that bomb and drops it on somebody or other. It doesn’t really matter who. The point is to drop it to prove the point. I want to go mad.

Chapter Fifteen

The Prick Of Conscience

I was fuming, nearly rigid with resentment and my highly developed sense of injustice, the one that I had cultivated in the Hungarian Civil War of my youth, the one in which as a boy I learned to live with the enemy in my midst and in the midst of the enemy, with that sense that all hell could break loose at any moment, that the political hooligans of the day were not just the tail that wagged the dog, they were the dog, the rabid homeless cur itself, the drooling hound that ruled the world by ruling the streets. Now I hear them growling around every corner, waiting in small packs to bring me down.

It all started with that kid Neddermeyer. Neddermeyer, who was he? What had he ever done? But the kid shot a long arm up one day from the back of the room and mumbled something about implosion. Maybe he didn't call it implosion. The word didn't even exist in his febrile mind, but he said he had a better idea for engineering critical mass in the gadget. Instead of shooting a subcritical hunk of uranium 235 at another subcritical hunk and mashing them together to make a critical mass, he said we should make the uranium into a sphere and blow it inwards from all sides. I was speechless. Everyone was speechless. Come on, kid, don't waste our time. How the hell do you make a perfectly spherical shock wave? Somebody said, that's like crushing a beer can and not spilling any beer. Even snotnose Feynman said, "From a theoretical, experimental and philosophical point of view, the idea stinks. It's a triple threat". Smartass. But stink it did. Except Oppenheimer encouraged the kid to work on it.

I was in Oppenheimer's office reporting on some detail of the Super, something about a new experiment with hydrogen and he said with no warning, "I'm putting Hans in charge of Theoretical. I thought I could handle it, but I'm giving it to Hans." That's all he said. Not even I'm sorry, I know what you were thinking, but Hans is the right man for the job.

"What about me?"

"I'm giving it to Hans."

"You promised it to me!"

"I don't make promises."

"Oppie!" I was still calling him Oppie then. "I had to talk Hans into joining the project, you know that. He thought we were a bunch of fools. I did that. I showed him Fermi's reactor. I explained the whole show to him. I got him on board and now you're promoting him over me?"

"He's got the right set of skills and the right background."

"He's a brickmaker. He doesn't build anything. He plods. He tinkers. He has no vision. He fills in the blanks. He will get you nowhere."

"He has mastered the experimental literature and the theoretical literature. He's my man."

He stabbed me in the back. That's what he did. "You will regret this," is what I think I said. But I cooled down and I apologized. "Because I care, Oppie. I care about this project. I care about you. Maybe I care too much, but I don't think so."

“Edward,” he said. “Work on the Super. Focus on that. That’s where I need you. That’s the job the only you can do.” Which was entirely true. I had the vision on the Super. I would bend it to my will. My feelings were hurt, but so what. I was a member of a team. I knew what to do.

Then they had a problem with their precious plutonium bomb. The gun technology wouldn’t work. The plutonium would explode before it reached critical mass because it was too reactive, like premature ejaculation, I quipped to Oppenheimer. Well we are men of the world. We understand each other on these points.

And so Neddermeyer’s ugly implosion idea was back on the table.

And then beautiful Johnny Von Neumann came to Los Alamos. What a sight for sore eyes. What a beautiful guy. The pride of Old Budapest. The man was so far beyond us, so godlike, so unearthly, he had to imitate human being so we would feel comfortable in his presence. And as luck would have it, Johnny had been working on a very similar problem, shaped charges he called it, for some a tank-killing weapon, they called it bazooka, don’t ask me why, I think they all read too many comic books. I mentioned the implosion idea and his brain lit up and we began to make calculations. They were going to implode a hollow subcritical shell into a solid critical mass, but I said, hey wait a minute, you don’t have to do that. Even a rock of solid metal like iron can be compressed, some guy I heard at a conference at George Washington was describing what happens to iron ore in the center of the earth, a million times the pressure on the surface and it compresses by 30%. Johnny got excited. “That’s perfect,” he said. “Edward, that’s brilliant. We compress a solid core and we avoid hollow cores and all the complications.”

We were really cooking. On the other hand I had to drop everything with the Super and we went to Oppenheimer and we told him what we had found.

Give the guy credit. He got it immediately. And he loved it, he really did. “You guys are brilliant, this is a huge shot in the arm. Maybe now we are back on track with the plutonium bomb. Maybe implosion has saved the day. Maybe you two have saved the day.” Just for the record, not Neddermeyer had saved the day, me, I had saved the day, Edward Teller. And Johnny von Neumann.

And then the brass put the Super on the back burner. We need all hands on deck for the U235 bomb and the P239 bomb, they said. Idiots. Small-minded bureaucrats. Never mind, because it gets worse. Bethe called me into his office, Mr. Head of Theoretical Physics decided to throw his weight around.

“Edward, I want you to lead the charge on this implosion idea. I’m putting you in charge of the calculations.” It took me a moment to absorb his words.

“Are you serious, Hans? This thing is going to require a backbreaking, herculean labor. Someone has got to calculate this thing by the seat of his pants. It’s a matter of guessing and refining, estimating and re-estimating. It’s going to be a marathon of trial and error.”

“We have some punch-card machines coming in from IBM.”

“So what? It’s still unheard of. It could take the rest of the war to get it right.”

“Then it will take the rest of the war. But if it doesn’t, it will give us a plutonium bomb.”

“You are doing this on purpose. You are trying to shut me up and put a stop to the Super.”

“The Super is a low priority now. I don’t care about the Super. I care about implosion.’

“I won’t do it.”

“I’m giving you an order, Edward.”

“You’re not my commanding officer, Hans. Who do you think you are anyway?”

We argued all afternoon. I had nothing to lose.

“This is a death march. You are putting me on a death march.” I exaggerated for effect.

“Don’t flatter yourself, Edward.”

I don’t remember how it ended. One of us got up and walked out. But I refused. I flatly refused. Bethe pushed me into a corner. I don’t stand for that kind of treatment. I never trusted him again. Why would I?

He had no choice. Teller had proved to be as disruptive as he had initially feared. Disruption could be a good thing, a useful tool when everyone is stuck. But Teller was diverting time, attention and resources from the necessary work of the plutonium bomb to concentrate on his far-off fusion bomb. Oppenheimer felt a certain hostility coming from Teller and he felt a certain hostility back at him. The guy did that to people. He raised hackles. He rubbed you the wrong way. He was an irritant, not a catalyst. Maybe Teller needed a way out of Los Alamos.

Groves had said no one leaves till the War is over. Security demands a hermetic seal around the place. But Teller might be induced to tunnel his way out in some kind of quantum physical, now he's here and now he's there kind of way that only mathematics could explain.

Next thing you know, Johnny and I got a really lousy result from our calculations on the fusion reaction of hydrogen. It looked really bad. I was at a meeting with the group leaders and we were all reporting on our progress.

“I have to say that Von Neuman and I are having a bit of trouble with our research. We have identified another potential problem, so for the moment I do not have anything to report, but I am, as always, confident that we shall work it out. The fault is in ourselves and not in our stars, if I may quote Shakespeare without meaning to sound excessively poetical.”

“And what is the nature of this problem,” Oppenheimer asked in that false innocent manner of his in which you may think he is just making small talk but he has sensed a weakness he may want to exploit.

“Forgive me but I thought I made it clear I do not think it necessary to trouble you with the details since they are bound to be of a temporary nature.”

“Edward, temporary or permanent, I'd like to get a sense of what the problem is. We have no secrets here. That is the whole point of Los Alamos.”

“You are making something out of nothing, Oppie.” That may have been the last time I ever called him Oppie except for show.

“Well now you’ve really stoked my curiosity, Edward. Methinks the Lady doth protest too much, if I may quote Shakespeare back to you without sounding excessively rhetorical.

That thing happened that happens at the back of your skull when you have been challenged to a fight. I stiffened. I looked down and when I raised my eyes to meet his gaze I saw an utterly smug and self-satisfied arrogance in his face that I had heard about so much but had not seen till then and which I have come to know as Oppenheimer’s characteristic stance against the world of well-meaning and straightforward men. I got to my feet.

“Are you trying to get rid of me? Because you are succeeding quite nicely. I have a good mind to walk out of this room and keep walking till I get to Santa Fe and then get the first train out and to hell with the gadget, to hell with you. You don’t need me. Fine. You don’t want me. Also fine. I am thwarted and stymied at every turn in spite of the fact I am making the single most important contribution to the War effort with my investigation of the Super, but if you don’t see it that way I no longer care to waste my breath convincing you and your cabal of uranium engineers of my worth.” Uranium engineers, that was good. I could feel that one go into his gut. “I know my worth. I know what the really valuable work is. But you are shortsighted and I am farsighted. So enough of this.”

And I sauntered out of the room bristling with malevolent nonchalance.

He conferred with Bethe.

“I seem to have ruffled his feathers. I guess I should make amends.”

“You don’t owe him an apology, Oppie. He owes you one.”

“I know, I know, but he is a man of pride. I see how it gets in his way.”

“It gets in everybody’s way.” Bethe was clearly furious. Oppenheimer needed to handle him too.

“Yes, I know but he is a valuable man. We need him around. He may be of use if we can get his mind off that damn Super.”

“He’s a second guesser. He is forever coming up with clever new ways to assemble the gadget. We don’t need his clever new ways. We’ve already got one. He is just showing off. And the rest of the time he is playing gotcha coming up with ridiculously remote scenarios in which the gadget fails. He’s like the kibitzer at the chess table. Sit down and play your own game if you’re so damn smart, instead of criticizing mine. He’s got nothing on the line. I’m really sick of the guy.”

“I grant you, Hans, he spends a great deal of time talking and not a lot of time doing useful research. Let me see if we can mend our fences. I like his sense of commitment. That counts for something. He’s passionate. He broods. That’s not a fatal flaw.”

“Hitler broods. Hitler is passionate. Fat lot of good.”

So now I was their little fusion troll, locked away in my underground dungeon in the Technical Area where my eyeless minions could carry on our dark and demonic research into nuclear fusion with deuterium and maybe tritium if we could figure out how to make the damn

stuff. No one set foot in my lab without my personal say so. No snooping Oppenheimers. No nosy Bethes. I was my own man now with my own stealthy, secretive fiefdom. I took my text from Archimedes, protector of Syracuse, who kept his great city free from its myriad enemies, one of the greatest scientists the world has ever known. He did his work in the fog of Greek superstition without the benefit of modern-day scientific methodology. They laughed at his obsession with the truth, the eureka man who leapt out of his bathtub and ran through the streets shouting because suddenly he understood the nature of displacement and the measurement of a volume. He felt his way in the darkness inventing science along the way, and eventually the upstart princes and their fawning ministers bowed down to his learning and the weapons he created to keep them safe in power.

Bohr arrived in Los Alamos in December of '43, god bless the man. Oppenheimer could not imagine a greater gift. Bohr, he hoped, would give them his blessing, like an itinerant rabbi traveling through the wayward shtetls where no house of worship stood, bringing light to the darkness of human endeavor and a measure of comfort to the morally perplexed. Bohr would see fit to bless their work, the fruit of their labors and make them acceptable in the sight of the Lord, in some paradoxically agnostic or atheistic sense, for none of them, not even the few practicing Jews among them, wished to acknowledge that Thou, O Lord, ruler of the universe through Whose word all things are called into being, Who has given His wisdom to those who

revere Him, Whose might and power fill the world, Who has sanctified us with His commandments and commanded us to kindle the light of the Sabbath, that He was there among them in their desert encampment, not even Oppenheimer himself, who considered himself more highly evolved spiritually than most, but who allowed for the possibility of a Hebrew God of War, a God of thunder, in whose sight they might kindle the light of a thousand suns in the desert of New Mexico and who wondered if they would ignite His wrath or would He forgive them for worshipping idols in high places.

Bohr sensed it almost as soon as he arrived, once he had shaken off the nausea of the switchback road that rose from the valley to the top of the mesa, once he had registered the controlled chaos of construction everywhere, once he had confronted the intense social familiarity of this colony of workers and acknowledged the hermetic seal that closed behind him: there was a moral and spiritual sickness among the men of this kingdom.

They came to him as penitents to their confessor. Fermi sat with him on the veranda of the Ranch School under a sky white with stars.

“Why don’t I just keep my mouth shut? What makes me speak? What makes me think this evil thought and put it into words?” Fermi spoke with a quiet intensity.

“What exactly did you say, Rico?” They had been talking about their children and how you teach by example not by command, when Rico’s bright face went dark and his eyes fixed on something Bohr could not see.

“We are all speculating on Heisenberg’s diagram and how it might be this secret weapon that is not a secret that the German High Command will reveal this year.”

“This kind of speculation is very dangerous,” said Bohr. “I was free of it in Copenhagen. I was blissfully unaware, incommunicado as we all were in Denmark until Heisenberg came to see me and left me with that cursed diagram. It is like some kind of untranslatable book of ancient incantations. I cannot get free of its spell.”

“I say very simply, and in all innocence, ‘I don’t see how they can be this far advanced as we are just because they maybe build a reactor pile,’ if that is in fact what this diagram you bring us is supposed to be, ‘but they maybe have got far enough to make a huge stockpile of radioactive waste.’ There’s nothing complicated to it if they can really run a reactor, which I doubt, and I do not wish to toot my own horn, but I of all people know it is hard to make such a thing, the false starts, the dead ends, how you can’t find material, the bad premises and the wrong conclusions along the way. But what about all this radioactive waste? I say. It’s deadly. It can turn into a weapon. And there we are in the heat of the battle discussing the dangers and I say we can gather up all our nuclear waste and explode it on their cities and irradiate them and poison their industrial plants and strike a deadly blow before they can get their secret weapon into the war.”

“Yes I see,” said Bohr.”

“Me, Niels. I say that. I put it on the table. Nuclear waste like mustard gas drifting in clouds over their cities.” Fermi felt his emotions rise in his chest and his throat tighten, but he spoke through his sorrow. “I speak it into being, Niels, this awful idea for a weapon of poisonous waste. I am a man with a wife and children. I come to America to escape from fascism. I say I am a man of peace and look what I do. These are the thoughts that fill my head.

These are the words I speak in all earnestness. I say these words and I want them back. I want to unhear them and unsay them. How do I look at my wife and my children with these thoughts of a monster inside of me?"

"Yes I see," said Bohr. And he did. He truly did. But he kept his counsel for the moment. He did not wish to speak too soon.

Another night, another snapshot of the stars wheeling overhead under a new moon on the mesa, the heat of the day no more than a memory in the cool breeze of his porch where Bohr had come to drink schnapps with Bethe, Director of Theoretical.

"Germany is my country. It is my people. No, it's not my Party and no, it is not my insanity. He has driven them all mad or they have driven themselves mad with a little push from the madman but I cannot get over this feeling that I am a traitor. I am true and I am a traitor. How is this possible? I am being pulled apart at the seams. My dreams, my god, Niels, my dreams are harrowing, fantastical, apocalyptic, operatic, Wagnerian. When I wake I stare in wide-eyed wonder at this inner world I have created and I think I will go mad. One day I will not awaken. I will find I live in my dreams with vague recollections of the real world instead of the other way around. I stand before firing squads and take volley after volley of rifle fire. I am shot to pieces but I do not fall. They push me out of an airplane without a parachute and I fall and I fall and I go on falling and I wait for the ground to rise up and crush me but I go on falling and falling and I never stop falling. How far can a man fall, Niels before he hits bottom? I am afraid one day I will find out and then I will be dead, killed in a dream that has come true. I know this makes no sense but there you have it."

“It makes a great deal of sense, Hans.” What they all needed was someone to listen to them, not someone to talk. At least not yet. Bohr was not yet ready to speak.

He hiked to the far corners of the mesa with Edward Teller, who walked vigorously, relentlessly. He marveled at the plant life flourishing in the dry determined heat, the small fierce birds that swung low through the tufts of grass, bathed in the hot sand and roosted in the tall spreading cottonwoods, los alamos they called them, the eerie silent snakes and the improbable frogs. Teller walked with his hands thrust deep into the khakis that drooped from his wide hips. He studied the ground as he walked, as if his thoughts were down there beneath the earth and he was reading them as they rose warily into the light to be illuminated by the sun.

“There is another bomb, Niels. Nobody speaks of it but me. Nobody studies it but me. Nobody believes in it but me. It is unimaginably more powerful and more important than their atom bomb. The physics of this new bomb is viciously complex because the energy created is enormously difficult to calculate. Because it is not a fission bomb. It is driven by fusion. So it’s not driven by chain reaction.

“How is it driven?”

“It’s driven by heat. It is thermonuclear. . I call it the Super. Hydrogen is the fuel. It is to their uranium bomb what the uranium bomb is to a campfire. There are subtleties here, bewitchingly complex. I am in awe of this fusion phenomenon and the complexity of what goes on in the stars. I was at wits end until Johnny von Neumann showed up. He has been a godsend. You know I do not like to collaborate. I am a lone wolf. But this collaboration with Johnny had been unlike anything I have known. He knows or has heard of every mathematical idea known

to man. I tell him my difficulty. He comes up with a mathematical idea. We dig around and find something or we move on. It is exhilarating.

“So this is what you are working on, not the fission bomb?”

“The uranium bomb is child’s play. They don’t need me for that. The plutonium bomb is a tricky bastard. I was glad to be of help. But this hydrogen bomb, it is the very devil. Whoever solves it will own the world. This is the deepest darkest physics you can possibly imagine. This is where we reach into the heavens and shove a fist in God’s face and say ‘Who are you to keep such secrets?’”

Bohr understood this was deep, dark physics, but he also understood that this was a deep, dark physicist.

“And what about the war effort and how we all pull together?”

“Niels, the atom bomb won’t win this war because the war is all but won. Bloody Stalin has seen to that. I fear him more than I ever feared Hitler. I fear Hitler in my gut. I fear Stalin in my soul. Oppenheimer and Bethe, they don’t get it. They have no sense of the opportunity we are facing. We can wipe our enemies away like pawns on a chessboard with a dismissive wave of the hand!

“Perhaps you should not be telling me these things, Edward. Unless I can be of some use to you in this regard.”

“But you can, Niels. You most certainly can.”

“And how is that?”

“You must help them to see what I see, that there is a moral calculus here that they have not yet learned.

“And what is that?”

“One that leads to the true value of this bomb.”

“But does it, Edward?”

“IN THE RIGHT HANDS, it does. We can make ourselves safe. We can defeat the barbarians at the gate. And then we can open the gates and live in true peace, for the first time in a thousand years. We must have this weapon. We must! It will be our savior.”

The bomb was like a sickness. Each of these men Bohr knew and loved fell sick in a different way with different symptoms and differing severity, but they were all infected. How could they not be? They didn't have the cure.

Oppenheimer took him to see the Tech Area. Bohr examined every inch of the cyclotron from Harvard. He asked for an explanation of how it separated U25 from U238. “Yes I see.” He repeated again and again, but there was something he was not getting, something in Oppenheimer's manner, his diffidence, an ironic detachment he hadn't expected given all the reports he had heard of Oppenheimer's magnificent rise to the challenge. Even Rabi had said Oppenheimer couldn't run a hamburger stand and here he was flipping atomic burgers and deep frying radioactive french fries.

“When you build this bomb Oppie, then what will happen? Will they pause and think my god what have we got? What have we done? Or will they simply put it in a bomber and drop it on Germany?”

“Niels, you of all people. Did you have any luck with Churchill?”

“Churchill wanted to have me locked up for the duration of the War?”

“Seriously?”

“I mentioned Russia. I have been invited. I see it as a great opportunity to open the dialogue we must have.”

“I’ll bet he saw it otherwise.”

“He did indeed. He saw it as a potential act of treason.”

“You have to give him credit. He knows how to fight a war.”

“Yes but does he know how to make a peace? What good is war if you can’t make peace? Is that not the lesson of the First War?”

“It is. It is. I agree.”

“So what do we do, Oppie? Do we just surrender the bomb into the hands of the Army Air Corps?”

“You have to understand, we are all perplexed about what to do with the bomb. This is not something you can investigate with a particle accelerator. There is no experiment you can perform that will show you the way. And you cannot look for a mathematical tool to get at it the

way Heisenberg used matrix algebra to investigate quantum mechanics, the way Einstein used differential geometry to investigate general relativity.”

“So you are stuck.”

“I am. I am stuck. I can’t go all in and I can’t step out. Is there a more nuanced position I can take? If there is, I fail to see it, Niels. Normally I am very good at this. But this is different.”

“I think,” said Bohr, “that history provides an answer. History is our text here, not mother nature.”

Oppenheimer got them all together at Bohr’s request. It was late in the evening. Everyone looked tired and a bit dispirited. Cigarette smoke hung in the air. Tough class, he thought, but I’ve had tougher.

“Gentlemen, thank you for coming. I am deeply impressed by your work. I am deeply impressed you, individually and collectively, if I may use that disputed word.” A few smiles. Many blank stares. “I sense a great disquiet among you, a kind of dread, a fear and trembling, if I may quote my countryman, Kierkegaard.”

Oy, Kierkegaard? Was he really going to drag in Hamlet’s next of kin while they were trying to win a goddamn war?

“It does not surprise me. I should be surprised, now that I am here, if I didn’t see the deep misgivings that I sense in your work.”

Not Teller’s work. He had no idea what Bohr was talking about.

“And I would like to address it from the point of view of our shared worldview, the world of quantum physics.”

Feynman thought, He has to be kidding. This meeting was turning into a meeting of the Young Hegelians right before his eyes. This he had to see. Ok Mr. Bohr, let me see your screwball. Let's see if you can even get it over the plate.

“I think you are all familiar with the notion of complementarity.” Some rustling of bodies in chairs, no doubt in anticipation of a lecture that was beneath their pay grade. “A photon can appear to be a particle or wave, depending on how you examine it. An electron also can appear to be a particle and wave depending on how you look at it. We have spent our best years in pursuit of clarity on this paradox and we have come to understand that the photon is both particle and wave depending on how you examine it, on how you measure it, on how you approach it. The same is true of the electron, the proton and the neutron. It is neither one or the other. It is both. That is what we have come to see as complementarity. That is the worldview that we have constructed in the world of quantum physics.”

He paused for effect. Teller scowled. Feynman grinned. Oppenheimer put down his pipe and looked around the room.

“I should like to propose to you, gentlemen, that the bomb is subject to this same complementarity. It may be our doom and it may be our salvation. It has within its nature the ability to destroy civilization and at the same paradoxical time the ability to end war as we know it. If you insist on looking at it as a weapon of destruction, that is exactly what you will see, the destruction of cities, the poisoning of atmospheres and waterways, the deaths of millions and

misery for all mankind. But there is another way to see the bomb. We can see it as mankind's first great miraculous chance to put an end to war. If we see it as a weapon of peace, we can make it a weapon of peace, contradictory as that may sound. The threat of nuclear war can galvanize us into action on behalf of all mankind. If the great nations of the world can agree to share the bomb, it can be used to prevent any of them from making war on each other ever again. So.”

Oh, he had their attention now. Feynman was rooting for the guy. Teller simmered with confusion, as if the siren had sounded but the danger was not yet clear. Oppenheimer had already figured out where Bohr was going and now watched to see how well he would do it.

“It can be war or peace. It can be the end or the beginning. It can be life or death. You here in this small scientific city can see it either way. I tell you from my heart I see it as the end of war, the end of terror, the end of greedy old men sending innocent young men to die on the battlefield. We have it within our power to use it either way. Unlike the photon and the electron, we have a choice because it is not an object of physics. It is an object in the affairs of men. If you think that you here in Los Alamos are tasked only with destruction, this bomb may destroy you before it ever leaves the ground. If you see this bomb's potential for bringing peace to the world, you can believe in this project and the good it can do in the world and you can believe in yourselves as waging peace and not war.”

Bohr stopped to collect his thoughts and as he did he heard the quiet sound of grown men struggling to control their emotions, deep breaths catching in chests, throats constricting and low

sighs. A few surreptitiously wiped tears from their eyes with the cuffs of the sleeves. One or two took out their handkerchiefs.

“This weapon we all fear, about which we have so many misgivings, can make war obsolete. It can make the warriors obsolete. Instead of a world ruled by dangerous, divided, untrustworthy men, we can have a world ruled by a safe and trustworthy sentinel of peace. I have the greatest optimism and expectation that this is your destiny here in Los Alamos.”

Bohr sat down and looked at Oppenheimer who had a joyous smile on his face and a tiny tear in the corner of one eye. He got up and walked over to Bohr and reached for his hand to shake it. Bohr stood to meet him. Feynman gave a schoolyard whoop and started clapping and then they all applauded and laughed with relief and surprise. For that brief moment they all shared Bohr’s vision. They entered into the depth of his humanity and found it to be a wonder. Except for Edward Teller who had left the room.

Hilarious when you think about it if it weren’t so sad. The guy comes traipsing down from Copenhagen trailing clouds of glory. He escaped from Copenhagen. He escaped from Stockholm. He’s one step ahead of the Nazis. He thinks he’s a one-man war movie. And he’s got this diagram from Heisenberg.

“Can you believe it,” he says, “It’s a diagram of the German bomb design. That sneaky bastard Heisenberg was trying to get me to talk. He wanted me to tell him what we are doing with our weapons program.”

Only it wasn't even a bomb!

Hans looks at it and says, "Niels, this isn't a bomb."

"What do you mean it isn't a bomb? Heisenberg gave it to me."

"OK, but it's not a bomb. I think I know what a bomb looks like and this is not it."

"Then what is it, Hans, if it's not a bomb?"

"It's a nuclear reactor, Niels. Heisenberg has given you a plan for building a nuclear reactor."

"But he said it was a bomb."

"Well if that's a bomb I'd like to see how he's going to drop it on London. It looks like it weighs ten tons. What does it look like to you, Rico?"

"Looks like a design for a nuclear reactor, very primitive," said Fermi with a smug smile on his face.

"What do you mean primitive?"

"This thing makes Chicago Pile-1 look like the Sistine Chapel. It's just a stack of bricks."

Everyone was sniggering at the idiot. Not out loud but you could see it on their faces. It was a design for a primitive nuclear pile and he thought it was a bomb. Like Hitler was going to build a ten-ton reactor and fly it over London and drop it on Buckingham Palace. It was ludicrous. Or maybe he was going to sneak some commandos into London with uranium and

TNT in handcrafted mahogany steamer trunks and they would construct an A-bomb in an abandoned Tube station and then run like hell for Scotland. The bomb would be a dud but the steamer trunks would be magnificent feats of German engineering and design.

So please. I do not think Mr. Bohr is the man to speak to when it comes to the politics or the military evaluation of the A-bomb. He is not up to date on any of this. This is not his area of expertise. This is my area of expertise. He should be listening to me

Chapter Sixteen

A Minor Detail Of Where

Near the fifty-yard line, which was the short cactus tree with three horns, Feynman was calling the play, which was pretty much bullshit and mostly for show but ritually necessary nonetheless. He was getting ready to take the snap, when he saw something he didn't like. Neddermeyer was split wide to the right, which was something he had seen the Tigers do against Columbia once or twice, although the Tiger were known for their single wing, maybe the dullest damn thing that football had ever seen although they did pretty well by it most of the time. His comically huge tailback was in the slot. The defensive backfield was creeping up close which meant they were thinking run on first down. "U235. U235," he barked. "U235!" He turned his head and barked it in Neddermeyer's direction. Neddermeyer looked at him like, "What the hell

is that supposed to mean?” “U235!” He barked it again and he could see the light go on in Neddermeyer’s head. U235 was the bomb with the 17-inch gun for a trigger, so it was the long bomb. Long bomb. Go long. He did, blowing right past the defensive backfield. He reached up for the pass, bobbled it comically several times, then gathered it in and ran all the way into the end zone, crashing into the barbed wire fence for effect. Feynman howled with delight as he trotted into the end zone and slapped Neddermeyer on the back.

“Are you kidding me? U235?”

“Yeah baby! You got the message!”

“When you give it to the tailback, you can call P239. Because he’s the Fat Man.”

Oppenheimer found to his surprise that he was standing the way his father stood, that when he sat he sat the way his father sat, leaning back and listening, letting his mind run, looking to help not hinder, reward not punish, evoke not repress. He was in some scientific way becoming the captain of industry his father had become. He was aware that he looked a man in the face without any hesitation, like his father had, and when he did, he felt what it must have been like to be his father when *he* looked a man in the face and said without speaking, what’s on your mind? How can I help you? What do you want from me? How can we be of use to each other? When he assessed a situation or a person. When he cut his losses. When he invested his

assets. When he revised his estimates. As if he were inhabiting his father's body or his father were inhabiting his. He liked these feelings.

There was not a significant detail about the Bomb Project that he had not mastered. He was at every moment of the day integrating every advance, every new detail, deleting from his mind every old, obsolete fact. He held the U235 bomb and the P239 bomb in his mind where he found a place for everything of interest that his teams had discovered, invented, assembled or any combination of those three. In some epistemological sense he was the Bomb Project and the Bomb Project was him. This feeling of his enormous power struck him not as a gift but as a burden, but one he was glad to bear.

He went to his desk first thing in the morning to read the mail from Washington, Chicago, Hanford and Oak Ridge. He assimilated the day's news and started his day. There was very little that he could not master quickly.

Until the day in January of '44 when a handwritten envelope appeared on his desk and in it a handwritten letter.

Dear Robert,

I'm done here, my darling. So, I am writing you this goodbye note. Have you ever noticed that life really isn't much fun? Most of the time we prevent ourselves from seeing this fundamental truth, but I have been given the grace to see it and it is the last and final straw. I have hung on for quite some time now because I knew I could end my life at any time. That has

been the only solace for this miserable existence I lead, that I might end it whenever I choose. And now I do. I end it here. And really it's lovely. It is the most wonderful exhilarating feeling. I thank god for the death I owe Him and hereby pay it back in full. I assume he will invest it in some other unlucky soul. That is not my concern. My only concern now is to say goodbye to you. They say we cannot feel death and so we cannot fear it. I think that is true. I don't fear death at all. I only feel a sense of loss, and not a loss for the life I lead but for the life I wanted so much to live, the one I could never find, the one that got away. Youth is so cruel. It filled me with dreams and hopes and then it dumped me on the shores of adulthood and said make your own way from here. And by the way, everything you know is wrong. Love is a lie. Reputation is a joke. Work is of no use. Play means nothing. I am so filled with hatred for myself what else can I do but be rid of me. I tried to love you, Robert. God knows I tried. And I think you tried to love me. But in the end, we just didn't seem to have it in us, and without that capacity, we are not fit for life. Perhaps I will come back someday so I can end it again. It really is a gift.

Goodbye, my only one.

Jean

It wasn't until he had finished the letter and the tears had ceased and the keening in his throat had loosened its grip that he noticed there was nothing censored from the letter. The Army had seen fit to send it through without a mark.

Well, he thought, there are no secrets here.

He walked out into the desert and listened to the birds. He remembered how she mesmerized him at loud crowded parties, the soft white glow of her skin against her angry black eyebrows, the long eyelashes and the quick eyes, the way she sat forward and almost hugged her knees on a sofa, how she grabbed a handful of hair to get it off her neck in the heat, how she swept it off her forehead with the back of her hand and looked up at him, annoyed, questioning, amused, proud. How she looked him in the eye when he lit her cigarette. How she stared at him across the room. How she barely touched the wheel when she drove that damn car. The way she said Robert like it was a warning and a come-on at the same time. He wondered how he would ever forget these things. Would the time ever come when he would search his memory for her?

He could not attend the funeral for reasons personal, military and political. Was that what they meant by a triple threat? He wondered what he might say if he were asked to speak. He imagined standing before a somber crowd in a raw wind on a bright day, feeling the sorrow and the judgment of her friends and family, and he heard these words:

Sky take her smoke

Earth take her ashes.

I will take her memory

Until time passes.

A bit presumptuous that. They would all share her memory, of course they would, but he didn't care to concede the point.

He existed in the universe. She had survived in the world. He stood in awe. She had knelt in pain.

He dreamed of her that night, the first of many dreams. He was at a party and he knew she was in the next room. He could feel her angry presence coming from behind the closed door. He didn't dare go in. She didn't care to come out.

There was a Quonset hut around the corner from Bathtub Row where Isidor Rabi held a kind of Friday night service when he was in Los Alamos. He was the itinerant rabbi who came to the shtetl to bless the babies and rule on disputes of Jewish Law, to marry the children and bury the dead, to lead the congregation when it became lost in the wilderness of the Pale. Rabi liked the tin cylindrical sound of the human voice when it was raised in prayer in this hut, singly or in unison. When there is no rabbi, there can still be a minyan. And there was almost always a minyan. It often had some of the aspects of a Quaker meeting, partly because there were several Quakers who joined from time to time. Anyone might speak. When he was in town, that someone was usually Rabi, who had a lot to say on the subject of Jewish life in wartime, the

Bomb Project, on the great heroes of the Hebrew Bible which he preferred to call the *Tanakh*, and which he was quick to point out was neither Old nor was it a Testament. He was also fond of pointing out that the Torah, the first and most holy part of the *Tanakh*, was in fact timeless, out of time, before time and instantaneously embedded within time by Yahweh when he spoke the Alpha, the first letter of the first word of the Torah, in which all the letters and all words of the Torah were subsequently to be found and written down by Moses some three thousand years ago and can be found today by the learned man who faithfully and diligently studies Torah. Just as the hydrogen atom contains within it the whole universe for the learned man who faithfully and diligently studies quantum physics. A great deal of what Rabi said went over a lot of heads not because they didn't know the Torah or quantum mechanics but because they were not used to Rabi's Talmudic mind which delighted in finding connections in the oddest and most unusual places.

Rabi was particularly proud of a recent commentary he provided at Friday Night Services in which he pointed out that the core of the plutonium bomb was going to be a mixture of polonium and beryllium that would give off approximately 95 million neutrons in the first full second of the implosion that would ignite the bomb. But only the first ten-millionth of a second would be required to provide the neutrons necessary to commence the chain reaction. And how many neutrons would that be in that first ten-millionth of a second? It would be ten. That is what the bomb would require and that is what the design would provide. Ten neutrons. A minyan, if you will. A minyan, he explained, is the number of men required to turn the futile, human words they speak into a prayer that reaches God in his heaven. It is also the number of neutrons nature requires to turn the laws of physics into a weapon on war. Amen.

On this particular night Rabi had a very different text to discuss and a very different minyan. Oppenheimer, Teller, Fermi, Feynman, Kiatkowski, von Neumann, Serber, Eugene Wigner, Philip Morrison and Hans Bethe had come to his aluminum synagogue to look for answers to their questions. Rabi always began by reciting the Shema. Some joined in. Some smiled. Some sighed. Then they were silent for a while as they waited for someone to speak. Not surprisingly it was Rabi. He had waited a decent interval, but there was something on his mind.

“Oppie, I don’t mean to put you on the spot, or maybe I do mean to put you on the spot. But there are rumors going around.”

“Izzy, there are so many rumors going around. Could you be more specific?”

“Come on, Oppie. We have all known for quite some times that Germany is going to be defeated.”

“Crushed would be a better word,” said Fermi, who was developing quite a vocabulary in his accented English.”

“Crushed,” said Rabi

“Germany is still very dangerous,” Oppenheimer replied as he studied their faces.

“Oppie, we have all heard the rumors about Peenemunde and the heavy water reactor.”
Bethe said.

“And we have all seen Heisenberg’s diagram. It’s not exactly a state secret anymore.”
von Neumann added with distress in his voice.

“What isn’t?” Oppenheimer asked.

“You know very well what.” Rabi again.

“Suppose you tell me anyway?”

“That they had a secret weapon. They were going to unleash it on the world and turn the tide of war. Snatch victory from defeat,” Serber chimed in hoping Oppenheimer would rise to their challenge instead of taking this passive stance.

Feynman wasn’t going to speak. He was going to listen but he had had enough. “And now we know. They have no bomb. They never did and they never will. They were some pointless last-ditch rocket in Peenemunde not a bomb and their big deal fighter jet, for which they had no jet fuel. They gave up on the bomb a long time ago. Heisenberg botched it. Or looked the other way. Or hid the truth from Krupp. Who knows? Who cares? What difference does it make? They have no bomb and they have lost the war.”

“Well this is good news, isn’t it?” Oppenheimer wanted to hear their thinking. Let them speak. He wasn’t stopping them.

“So the question is: is this trip necessary?”

“What trip, Richard?”

“You know what trip. This bomb. This project. Fat Man and Little Boy. They will be all dressed up and nowhere to go. Why are we still building them?”

He took a moment, the way he did, so that they could see him gathering his thoughts, so that they would hear him more clearly when he spoke.

“For some time now it has been clear the bomb is meant for Japan.”

“Meant for Japan? What kind of nonsense? You mean ordained by God??” Rabi was shocked by the evenness of Oppenheimer’s tone.

The powers that be, you know who I mean, Bush and Conant, FDR...”

“FRD is dead.”

“Truman. Bush and Conant, Harry Truman, Stimson, all of them agree the bomb will be of use against Japan.”

“Will be of use...???” Rabi’s whole body went tense with frustration.

“A hard target surrounded by a civilian population.” And then more quietly. “To bring them to their knees.”

“Oppie. You cannot be serious.” Rabi knew he had to stay calm or the facts would be submerged beneath their emotions and he needed the facts.

“A great deal of thought has gone into this decision.”

“What decision do you mean?” Bethe asked.

“To target Japan.”

“Are you saying all of this has been decided? We don’t even have a bomb yet.” Bethe wished to simply point out the facts but he was very close to pleading.

“We will. One at least. Hopefully two. Possibly three. By August at the latest if my timetable is correct.”

“You’re being very cool about this,” said Rabi.

“You see a difference between Germany and Japan?” Oppenheimer asked the obvious question.

“No I don’t. They are both defeated. It is just a matter of time,” said Rabi.

“There is the question of our resolve.”

We have won two wars, one in Europe one in Asia. Who questions our resolve?” Bethe was incredulous.

“Our resolve to use this weapon.”

Silence. Breathing. Stares around the room.

“And what about this idea of a demonstration that everybody is talking about? We do a demonstration somewhere in the Pacific,” said Feynman.

“If the bomb is as powerful as we think it is, they will ask themselves why didn’t we just drop in on Toyko. They will question our nerve,” said Oppenheimer.

“Oh come on, man. We can always drop one on Tokyo.”

We don’t have any spares, Richard. We want them to think we have dozens, but we don’t. We don’t want them calling our bluff. It will save lives. That is the calculation they have done.”

Rabi rose to his feet to contain his agitation. “How long do you think the bomb will belong to us alone? It’s won’t be ours for long.”

“Forgive me for saying this,” Bethe added, “because the Bomb Project is a magnificent scientific achievement and all to your credit, but how hard is it really to build a uranium bomb. It’s a question of time and money. It’s not about our genius much as we would like to think so. This will be your legacy, Oppie. There is no Nobel Prize For War.”

That went right through him.

“But there is a Nobel Prize for Peace.” Rabi picked up the thread. “You can build this bomb and make it a tool for peace. This is the whole point. I saw the look in your eye when Bohr spoke. You were all for it. What has happened to you, Oppie?”

“What do you mean, ‘you’? Am I building this bomb alone? This is not my bomb. This is our bomb.”

“I am chilled to the bone by this conversation,” said Rabi. “Are we the Sanhedrin? Have we come to condemn Jesus for our cynical purpose?”

“Surely you don’t put any value on the authors of the Gospels?” Oppenheimer could feel the heat in his forehead. “They are the founding fathers of the Nazi State.”

“I only mean the story has its parallels here. Who are we now? We were idealistic scientists who wished to save the world. Now we are fools. They are making fools of us.”

Teller had not spoken. The question in his mind was this: does Oppenheimer really mean all these things he says? Or is he covering up his doubts? Why does he not speak of his doubts? I suspect he has many. Nevertheless, he cleared his throat and said, “If you put a pistol on the

mantelpiece in Act One, you have to use it in Act Three. That is what Chekhov says and he ought to know.”

“This not Chekhov, you idiot. And it’s not a pistol. It’s an atom bomb.” Feynman was aghast.

“It is in a way,” said Oppie, getting it immediately. “We are telling a story for the world to hear. It has to make sense. It has to mean something clear and specific.” He had not wanted these words to come out of his mouth. He had hoped it wouldn’t be necessary because it would be clear they already agreed. But that was not the case. Was he really so surprised?

Teller placed himself on Oppie’s side. He was ok with that. For now. For now it was useful to be allies.

“It seems we are wasting our time here,” said Rabi with a look of profound sadness.

Oppenheimer realized he had to come clean.

“Ok. Look. Here’s the story just between ourselves. And I mean that. This goes no further. General Marshall and I were asked to meet with Truman’s guy James Byrnes and his boys. We walked them through the value of cooperation with Britain and Russia, sharing the science, sharing the technology and etc. We were just getting started on the idea of a demonstration bomb, you know, how would you actually do it, where would you do it, would you invite Hirohito, would you invite Uncle Joe, isn’t that a little bit far-fetched, and maybe the Japanese won’t be impressed anyway, maybe they’re too far gone at this point. You know what happened at Iwo Jima. Twenty thousand dead. They fought to the last man. Would Honshu be

any different? And then there was a brief discussion about saving American lives with the invasion, how many lives, that kind of thing. And then somebody mentioned the Super. Somebody said it could yield 100 megatons of TNT and Byrnes stopped dead in his tracks. And I mean dead in his tracks. Clearly he knew nothing about the Super till that second. ‘A hundred megatons of TNT in one bomb and you want me to give that to Joseph Stalin? Are you out of your mind? You must be a Bolshevik,’ he said. ‘Are you some kind of Bolshevik, Mr. Oppenheimer?’ That was it. The meeting was over in ten minutes. In ten minutes they decided to drop the bomb with no warning on Japan. It wasn’t even close. And that is it in a nutshell, gentlemen,” Oppenheimer concluded.

He had laid his cards on the table, except he hadn’t really. Not even close. He hadn’t painted the real picture. He had left himself out. How he had gone in knowing this was his last best chance to make the bomb public, to be open with the Russians, to warn the Japanese, to lobby as fiercely as he knew how for international control of the bomb, all of these, each of these, all of them intertwined and yet separate. How General Marshall had turned full circle and come to his defense, General George Marshall who had maybe one less star on his chest than God Almighty. How Marshall had expressed a hope of Russian cooperation if we are open and above board, they are our allies, they have met every promise they gave us, they have carried the burden of the war, they deserve our cautious respect, how he felt the tide turning and hope at last that the scientists and the military could make common cause and knock some sense into these self-righteous politicians. And then Truman’s man Byrnes, who the hell was this guy anyway? He was no FDR. He was no Harry Stimson. He was no one at all until he banged a fist on the table and shouted that they were giving Stalin the opening he needed to demand to be brought in

on the Bomb Project and how the hell was Harry S. Truman going to explain that to the American People if it ever came to pass. And how he could say nothing coherent in reply. Nothing that didn't make him feel like an idiot and maybe a traitor. And as for sparing Japan he had carefully and quietly painted a picture for them of the terror and awe a demonstration would inspire, how they had little or nothing to lose by it if they were careful. And then James Conant stopped him in midsentence and said a better idea would be to demonstrate the bomb on a Japanese city with a vital war plant, one where the workers lived in housing surrounding the plant. And how he could say nothing in reply. How he could not bring himself to speak. How miserably he had failed. How he did not stand up to the crass bastards. How polite were his objections, how rational his reasoning, how ineffective his arguments. Those cards he did not lay on the table. How could he?

“Some nutshell,” Feynman said not quite under his breath.

Teller had been nodding his head.

“You have something to add, Edward?” Oppenheimer asked.

“I would like to make one point.”

“Fine, you have to floor,” said Oppenheimer.

Teller rose to speak. “We will win this war one way or the other, one body count or another. You may say that is cynical. That is not the point.”

“Then what is the point?” Rabi asked.

“My point is this. The next war may very well be the end of mankind. I say use the bomb. Let the world see what it can do. That may very well be how you save the world.” He sat down carefully.

“That goddamn Super,” said Rabi, “It screws us every time it comes up. Nobody can see past the Super. It kills whole nations. It is too dangerous to fathom.”

Teller was thinking, Of course of course, it is just as I said. When will you all admit I was right all along? The whole point of this exercise is the Super, not your dirty little fission bombs. Finally, at long last his point was being made for him by the guys at the top. God bless them.

“This bomb was going to be used for peace,” Rabi continued. “Bohr spoke and we all saw it. We all understood when he said complementarity. The bomb has two sides and we all said yes it can be used for peace. How is this peace? How does this advance the cause of peace? This breaks my heart. It shames my soul. Why did I ever think there was a higher purpose to this bomb? I must have been out of my mind. Terror is not peace. Bringing Japan to its knees is not peace. This bomb is like a hardon to a teenage boy. When do I get to use it? When do I get to feel what it’s like? And we were going to be celibate? I am ashamed of my ignorance and naivete.” No one actually said it but Oppenheimer could hear them all thinking it. He was thinking it himself. There was nothing left to say.

“Meeting adjourned,” said Rabi. “There will be no benediction tonight.”

Had he put down the rebellion? Would they continue to pull together? He knew what was in their hearts. Fear and shame. He knew because he felt it too. They had all been played. He had been played.

“What does it profit a man...?” Rabi spoke through the tears. It hung there in the air.

“You seem to know an awful lot about Jesus, Izzy.” Oppenheimer immediately wished he hadn’t said it.

“It doesn’t matter who said it.” Rabi was furious. “If you can’t see the truth of it...”

“I can, Izzy, I can.” Of course he could. Once. Once upon a time his deepest thoughts were about the gravity of stars. Physics had been about the beauty and order of the natural world. Now it was no such thing. Now it was death and the morality of total war and the politics of empire. God in heaven, where are you now when I need you?

We are all connected. All of us no matter who or what we are. From my point of view, I am a part of everyone and everyone is a part of me. So who is telling this tale? I am. We are. We are all the bomb and the bomb is all of us. The autobiography of the bomb is the autobiography of us all. Even the ones who fail to get it, who miss it or dismiss it. When you listen to this story, you are listening to yourself.

He did not have the strength to rise. They were all gone except for Rabi who had enclosed himself in his private thoughts. Maybe he was waiting for Oppenheimer to speak. He

couldn't tell. But he had nothing more to say. He rehearsed and reviewed the meeting. What he might have said. What he might not. Teller appeared in the door of the hut. His face was a ghastly white in the glow of the fluorescent lights off the aluminum walls.

“Whose side are you on, Oppie? Whose goddamn side are you on?”

“Izzy, will you give us some privacy?”

“Oh yes by all means.” Rabi made his way past Teller who stood there like Moses with his tablets.

“Why don't you come down off your high horse,” he said as he was going.

“We would like some privacy,” Teller said. “You heard him.”

“Fine. I give you all the privacy you so richly deserve.”

Rabi looked him up and down as if he were sizing up some Catholic kid in a street fight on Mott Street in Little Italy. Sometimes it's best to walk away because the other guy's too big for you or there are more of them than there are of you or he's got something ugly in his hands and he really might use it. But sometimes you make your move and damn the consequences because you're so goddamned angry and scared and you've got your pride and all that teenage bullshit. And sometimes you just want the smug Italian bugger to see what a hoodlum he is and know you're not afraid of him.

“Look Teller,” he said. “We all know Yahweh is somewhere in that bomb.”

Izzy was always coming at you out of the blue. What was he up to? What Talmudic obscurity would he expound?

“I don’t believe in Yahweh, Izzy. I’m not some kid in Hebrew school,” Teller dripped with condescension.

“But you know it instinctively, God is in the bomb. You saw him rise up from the desert floor of New Mexico just as he rose from the desert floor of Canaan in the age of the Patriarchs. You don’t have to have faith. You don’t have to believe in anything. We have proven Yahweh’s existence with plutonium. And yes we all would love to have unleashed him on Germany. That’s why we came here. But we can’t. So what do you want, Edward? What the hell do you want with your fusion bomb? Do you want to see God at any cost? Is that it? Will you pay any price to see His face? I think you better ask yourself because you are not Moses. You cannot look upon Him and live. If there is anything we learn from the Torah, this is it. You cannot look upon God and live.”

And he walked out.

Teller took only a brief moment to ignore Izzy’s advice. He would look on God if he so chose. He would scour the world and find the Ark of the Covenant and take it into battle. He would enter the Holy of Holies. He didn’t believe for one minute that any of this was literally true but he recognized that he had touched the source of all power in creation, that he alone could speak to Nature and chain it to his purpose. No one could alter his ambition. No one could turn his pride into shame, not even a crafty rabbi. He gathered his indignation and turned it on Oppenheimer.

“You are playing a dangerous game. I cannot figure you out.” he declared.

“That’s not your job, to figure me out, Edward.”

“I think you have misgivings about the bomb project. Do you have misgivings?”

“No, Edward, I have no misgivings. But I see it from all sides. That is my job.”

“Do you see it from my side?”

“What is your side, Edward? As far as I can tell you are determined to build the most powerful bomb you can and damn the consequences.”

“I know the consequences. I have calculated the consequences with great care. We have the A-bomb. They will have it soon enough. We will have the Super. And we will have a window of opportunity with which to –”

“Who is this them?”

“This them is Stalin. This them is the Soviet Union. This them is dictatorial communism. If you don’t know who this them is, then I wonder are you fit for this command.”

“I should have fired you a long time ago, Edward, when you refused to do the calculations for the plutonium trigger, but I didn’t because I thought, he is an original thinker, he has more ideas in a day than most men have in a year.”

“Oh please.”

“But truly I am sick of your ideas. If I could get you off this project now I would do it in a heartbeat. But they would send you to Alaska to sit out the war incommunicado and I don’t have the heart for that.”

“Well I thank you for that.” Teller hadn’t thought he would do that. Now he wasn’t so sure.

“And I keep thinking Edward is here for a reason. Edward will make a contribution, maybe a huge contribution. Only time will tell.”

“I have made my contribution.” He was vehement. “You refuse to see it. You refuse to accept it. And so I ask you, whose side are you on here?”

“I’m not on your side, Edward. Your side seems to be a side of one.”

“I am only a side of one until everyone comes around.”

“What’s eating you, Teller? Are you still mad because I didn’t give you Theoretical? What is this chip on your shoulder?”

“Ok, let’s put our cards on the table as they say.”

“Yeah why don’t we. What?”

“I don’t trust a man who fools around like you do. I don’t trust a man who cheats on his wife.”

“You lousy hypocrite.”

“I am no hypocrite. You sleep with communists. You sleep with children.”

“I don’t sleep with children. What the hell is your problem?”

“They sure as hell look like it.”

“Bullshit, Edward.”

“That woman is a spy and you goddamn know it. Everybody knows it. You think they don’t know why you went to San Francisco? You went to see *her*. Parsons came to me. He thinks you are passing secrets to the Soviets. He would have you arrested if he could. I said, you guys are out of your mind over there in Army Intelligence. Oppenheimer cannot keep his dick in his pants but he can keep a secret. But really I am not so sure.”

“The pot calls the kettle black. Do you know that expression? Because I know all about you and Maria whose husband is in the South Pacific.”

“You know nothing about me and Maria. We are chaste. We have respect.”

“Respect for what, your reputation?”

“Respect for Jewish Law, by God, which you do not.”

“Who are you kidding, Edward. I have reports. They warned me about you. They warn me about anyone who can be blackmailed.”

“Then they have warned you about all your hotshots, haven’t they? Feynman, that hoodlum, that motorcycle man? Why would you trust him over me?”

“You leave him out of this. His wife is dying even as we speak.”

“He keeps the whorehouse in business.”

“And who are you to cast this stone?”

“You *too* seem to know an awful lot about Jesus.”

“It has nothing to do with Jesus.”

“Then let me tell you the facts and we will see if you can understand. The A-bomb is decisive. It is a decisive weapon and so it must be used.”

“And who says otherwise?”

“And the Super is one thousand times more. And so the need to build it and be ready to use it and have no qualms and use it when and if is one thousand times more decisive than the A-bomb.”

“Where do you draw the line, Edward?”

“There is no line. I do not draw it.”

They saw each other now with mutual respect and mutual contempt. They were steeped in it.

“The Super is inevitable. Get out of the way or it will run you over.”

“Remember when we all started out and we hoped we could prove the bomb wouldn’t work. Remember that? I put you in charge of disproving the bomb. How ironic in retrospect because you, Edward, seem to hunger for it. You want it more than anyone here, more than everyone here. It seems to be your mission in life.”

“Ironic because it is you who will be remembered as the man who won the Nobel Prize for War. Not me. Embrace your destiny, Oppie. You really have no choice.”

“We shall see. When the war is over, we shall see who is right, you or Niels. You are the opposite poles of this complementarity. We shall see how you exist at one and the same time.”

“The bomb will make itself, Oppie. It has its own logic, its own will to power, like a living thing. Don’t you feel it?”

“I have never read Nietzsche, but I know instinctively that is not right. If that is what Nietzsche said, then you are misusing his ideas the way the Nazis are.”

Teller looked at him as if he were a child or perhaps a backward student who did not get the calculation on the blackboard. “Has it ever happened the history of mankind that the princes and their generals have said to the scientists, ‘No, we do not want your weapons of war. Take them away and do not trouble us.’ No, it hasn’t. And it never will.”

“Edward, my god, has there ever been a weapon like this? Do you have no sense of proportion? Do you have no sense of restraint? Can’t you even pretend to have a conscience?”

“With them, yes. With you, no. They don’t count. They will all wring their hands and someday they will tell their shrinks and agonize all over again for \$40 an hour.”

“Why don’t you say to the generals and the princes, ‘Here is a weapon for you to commit suicide with.’ Then see if they want it.”

“It’s not suicide if it kills the other guy first.”

“You ever hear that line from Milton where he is speaking of Satan and says that he would rather reign in Hell than serve in Heaven.”

“What is that supposed to mean?”

“Earth will be a blasted wasteland, but you will be in charge.”

“Then we will start over. But we will start over as the winners, as the survivors.”

“So now we are even, Edward. You don’t trust me and I don’t trust you.”

Chapter Seventeen

I Am Born

In the beginning (if I may use that phrase without irony) I was mere thought or perhaps I should say pure thought. I was a picture in the ideal realm which was somehow plucked into being in the souls of men, an assembly of theory and technology. I was inventing myself in the minds of the physicists, engineers, construction workers and Army brass who inhabited Los Alamos and the professional politicians who inhabited Washington, DC. Slowly but surely I materialized out of pure thought into the material world. They sometimes refer to it as the external world, whereas they think they inhabit some kind of internal world in their thoughts that miraculously mirrors this external world in a way that only their philosophers can explain to them. But it is so much more complicated than that. First of all, there was more than thought out of which I materialized into their world. There was hatred for the Japanese, the gut level loathing of their kamikaze tactics, their banzai charges, the barbaric way they treated their

prisoners of war as subhuman scum. There was the fear of death, the urge to conquer, the frenzy of battle, the lust to kill. They thought they were insulated from all that on their mesa in the desert, but no, they channeled it intensely through a collective consciousness of Normandy, the Ardennes, the liberation of Auschwitz and Dachau, the firebombing of Dresden and across the world from Pearl Harbor, Gaum, Wake Island, Corregidor, The Philippine Death March, Iwo Jima, Okinawa and the firebombing of Tokyo, channeled it into a lump of plutonium seeded with polonium and beryllium, encased in a shell of uranium and all of it surrounded with explosive charges of TNT (that quaint, outmoded killer) which had been engineered with obsessive mathematical precision. If I had to ask myself which of them was the biggest part of me, I'm not sure that I would say Oppenheimer. I might very well say von Neumann. Oppenheimer had the deepest picture of the whole project, but von Neumann knew me most intimately, my radioactive guts, my wiring, the timing of my implosion, how it compressed my plutonium core from a state of safety whose half-life was 24,00 years to a critical mass with a half-life of bupkis and then began chain reacting with the introduction of lethal neutrons, the timing of the neutron initiator to create the ten or so neutrons needed to set me off, the properties of the uranium tamper that reflected the stray neutrons back into the chain reacting plutonium, the heat generated, the speed of expansion that would so quickly extinguish my chain reaction but not before I blew open the doors of hell. Until I became their collective perfection of a weapon of war.

Christy, Kistiakowski, and Neddermeyer had been working like dogs, like demons to bring me to life, to reproduce in the real world of gadgets and devices John von Neumann's calculations concerning the controlled implosion of TNT through precisely focused shock waves that would create the smooth and symmetrical compression of a sphere of plutonium into a

critical mass. The calculations had been prodigious. They would have broken the minds of lesser men.

But brilliant as they were, as a blueprint for the construction of an implosive device, these calculations were a roadmap in a blizzard. Kistiakowski and Neddermeyer labored mightily with their small crew to get results that followed from von Neumann's calculations. Their ordnance lab was a canyon on the outskirts of Los Alamos where they ran a continuous series of jerry-rigged explosions that came closer and closer to the mathematical ideal with which von Neumann had provided him. One day they did it. They got a result that when examined after the fact, when picked apart by metallurgical autopsy and analyzed for cause of death, suggested they had imploded a dummy core with the precision required to ignite a plutonium core. And lo, I awoke and was incarnated out of the Bardo of Dreams and became a living thing in the material world of men. And like the spark of the divine that lives in the souls that inhabit men's bodies, a spark of divinity inhabited me. The spark of my divinity animated me, thrust me into the collective consciousness of the world. I spread into all conscious life as the promise of death and destruction, of terror and despair. On that morning in Hot Springs, Arkansas, Franklin Delano Roosevelt, old warhorse of the Depression and the War, suffered a massive cerebral hemorrhage, collapsed and died.

How did I do that? I did not do it alone. They all did it, who thought me into existence. I put him out of his misery, kept from him seeing this ultimate act of modern barbarism, this final straw of 20th-century evil, the one that was my destiny.

The world mourned. I mourned. Who would be my champion now? Harry Truman felt my presence in his sleep, a shadow that haunted his dreams. When he awoke, Eleanor called him and said, "You must be the President now." Harry Stimson came to his office and said, "We have this bomb." As he spoke, Truman had the feeling that he knew it already and knew exactly what he had to do.

Just to set the record straight I would like to point out that von Neumann got some unexpected help with his calculations for the plutonium implosion device. In the spring of '44 IBM delivered to Los Alamos a set of IBM 601 electrified calculating machines, which von Neumann put to work doing the insanely repetitive, brute-force calculations that he needed to calculate the implosion charges and shapes. The 601 looked like a Victorian Era sewing machine that had been electrified by Thomas Edison and Nicolai Tesla on a cocaine spree and brought to life by Victor Frankenstein on a dark and stormy night. It was jam-packed with relays and mechanical accumulators that could store two numbers from a punch card, add the two numbers together or, praise God, multiply the two numbers together and print the result on the same punch card. Someone had the bright idea to attach the 601 to an IBM 285 Tabulator that would transfer the resulting number from two such cards onto a third card and feed the result back to the 601 to do the next calculation in the Sisyphean sequence that von Neumann required of it. They were no faster than the human computers at doing this work, but the thing is they

never got tired, they never took a break and they were never wrong. Except for one small fly in the ointment: they broke down like a Ford jalopy at a drag race marathon. So me and a couple of other guys had a brilliant idea to set up a fix-it shop in the T Area. Von Neumann said, “Feynman, if you can keep these machines running, I will remember you in my will.” Me and the guys went to work like teenage grease monkeys repairing, pampering, psychoanalyzing and otherwise babysitting the 601’s and 285’s to keep them in working order. We would put them back together any way we could. We would use *papier maché* and bubblegum if that’s what the situation called for. IBM had a conniption fit because no one was allowed to look under the hood of their machines ever under any circumstances. But screw that. IBM wasn’t building a bomb. We were. I was. IBM wanted to sue my ass, but General Goddamn Groves said over his dead body. So we kept those machines humming. Occasionally we had to cannibalize one to keep the others going but there was always more where that one came from. Von Neumann, who had a million ideas in his head at once, got very fascinated by the 601’s and I could see they had his attention. I asked him what was his opinion of them. He said, “If I had known about these contraptions, I could have invented an electronic computer to do the calculations in less time than it took to do the calculations themselves. Next time I shall not make that mistake.”

Oppenheimer spoke eloquently to the Los Alamos assembly. He loved FRD. Everybody loved the guy. At the University of Chicago, according to Szilard, people wept openly in the

quads as they wandered out of their dorms dumbfounded with grief. At Northwestern, on the other hand, he heard that they came streaming out of their dorms laughing and shouting with joy, the coupon clipping little bastards. Never mind. Oppenheimer spoke of devotion and duty and leadership. Afterward, he went for a walk down Bathtub Row with Rabi. They both felt a need to express their feelings and not their thoughts, which was awkward, as they were unaccustomed to expressing their feelings. Rabi was in a strange, distant mood. He said, "I see FDR as Moses. A great and fearless leader who is struck down by Yahweh in Moab before he can enter the land of Israel."

"In the case of Moses," Oppenheimer replied, "he was struck down as a punishment for some crime, wasn't he?"

"He was."

"And what was his crime?"

"That has been a matter of controversy for two thousand years."

"And what is your thinking, rabbi?"

"He looked upon the Face of God, my son."

"And how is that like FDR, rabbi?"

"I have no answer, only the question. But I will tell you this. A man cannot rise that far above other men without arousing the jealousy of his God."

"Izzy, that is such a strange thing for you to say."

“Julian might have conquered Persia but for a traitor. Alexander might have conquered India but he got that fever.”

“Doubtful, but go on.”

“So often this is the case.” Rabi warmed to his theme. “The great man is cut down by fate, by a fever, by a traitor, by a wrong turn, a missed opportunity. Why? Because he knows too much. And God punishes him. In fact, if I may extend my commentary, this is why we all die, Oppie. As we grow old, we become like gods, wiser than we ever knew. God does not like it. This is the true story of Adam and Eve. God saw they would grow as wise as He was. So He made them mortal. He brought death into the world to protect himself from the wisdom of the man he had created. He thought he had given us only a tiny spark of the Truth and that He might enjoy us in the marvelous creation he had devised. But that was not the case.”

“I hope,” said Oppenheimer, “that I do not live long enough to die of wisdom. That would seem to be the hardest death of all.”

“You think?”

“The more you know about the world, the more you have mastered it, the harder to let it go.”

“Or maybe it makes it easier. Depends on how much you like what you see.”

“Izzy, you are in a strange mood.”

“I’m just sick of the war.”

Oppenheimer had a safe in his office. Bethe had a safe in his office. Teller had one too. Groves didn't have an office per se but he had a safe. I got a bee in my bonnet about cracking them. It's really not that difficult. At Bronx High School of Science we used to take turns cracking the safe in the principal's office, and we would leave him little souvenirs. One time I left him one of Tommy Cammarero's high top sneakers. The principal didn't have a clue. Then Tommy Cammarero left him my pinky ring. I had to go in there and crack it to get the thing back. I read a couple of books about safe cracking on the subway to school one morning and I was off to the races. That's a long ride from Far Rockaway, Queens, the A train to the number 4, quite a hike. First I would do my homework. No I'm kidding. I didn't do homework. Homework was for idiots. If you are doing homework at the Bronx High School of Science, what are you doing at the Bronx High School of Science in the first place? I taught myself trig and analytic geometry on the train, not to mention how to talk to girls. At school I would just look at the blackboard and get it. If I wasn't sure I got it, I would ask the professor to explain it. And he would say, "Blah blah blah, Mr. Feynman." And then more often than not I would say, "That's not a very good explanation. Isn't it more like yada yada yada, Professor Rosenstein?" (Because he changed it to Redstone and that is not kosher in my book.) And more often than not he would say, "Smartass, get out of my classroom, you're so clever." So early one morning I was in Bethe's office which was just down the hall from Oppenheimer's and I was working on his safe which was a son of a bitch, and I heard Oppenheimer in his office and he was crying. I mean he was weeping. I heard stifled crying jags. I heard him gasping for breath and I thought

ok, one of three things. One. His wife up and left. She was miserable and drinking heavily. Two. Something happened to Jean Tatlock. I knew how much he loved that woman. Three. FDR had died. He'd been looking awful in the pictures in the papers. Most people wouldn't notice this, but his fingers had grown dry and blistered and the skin on his hands was swollen. This is what happened to my grandfather before he keeled over from a massive coronary. So yeah I said to myself FDR's ticker is not pumping blood to his extremities like it should. The man is probably sick, and sick unto death he was. The war didn't kill Churchill or Stalin but it got to FDR. And then there was all this crap about are we going to drop the bomb on the Japanese even though we have essentially won the war. What would FDR have done and Harry Truman cannot hold a candle to him. But here's what I think. FDR would have dropped that bomb a hundred times over. FDR was a great man, a gentle soul with a will of iron, a rare thing in this world. But the bomb had an implacable logic that was stronger than the will of any one man. FDR could not have resisted it. If I may descend to the gutter to make a point. The bomb was like an orgasm. Once the fuse is lit, I defy you not to come.

They had found a good location for the test. It wasn't perfect but it would do. The heat had been relentless all day but now the desert was cooling off beneath a starry halfmoon sky. Soon there would be a chill in the sharpening air. He had almost grown used to the presence of the Milky Way, but some nights it seemed to throb and glow with a human hint of its immensity

and this night was like that. He had been thinking all day of a night beneath the stars, not on the ground because of the rattlesnakes, but in the flatbed truck where he could lie with his hands behind his head and look out into the galaxy. The only thing missing was the horse he wished to ride. He drifted easily through the years in a way he hardly ever allowed himself to drift. When he was a schoolboy, he had dreamt wild and uncompromising dreams. They had been thrilling and daring and they had helped him with his fears and doubts and propelled him into life with almost too much force. He recalled how he had overcome his own musclebound arrogance, how he had found his *métier*, his vocation in quantum theory and atomic physics, how it felt like a revelation from a higher mind, like a kind of grace, that there should be such a thing in the world that could captivate and engage him like that. Now he commanded an army, but it was not nearly as satisfying as the dreams had been. He doubted he could ever dream like that again. He heard the sounds of Riverside Park in the early evenings when kids were still playing themselves out on the swing sets that he could see from his bedroom window. He remembered lying in bed with a book he must read, had to read, needed to read with an appetite so immense he could scarcely believe it now, how he had longed for success, like one longs for a woman although he couldn't know that at the time. Now that he had it, what was it? It was trouble. It was a shameful appetite. But it was also glorious. Success, not women. No, women as well. That made him smile. He remembered the Harvard Man, the knifesharp student slicing his way through the canons of science and the more subjective and therefore suspect disciplines whose worth he sensed but could not explain. He recalled how time had passed so differently then. Forget Einstein. Forget the science of time altogether. Recall instead how a school year had seemed an eternity, a vast comforting sweep of time in which he might live an entire life of

expectations, fears, calamities and victories. How “six months from now” seemed like the distant shore where he might make his fortune or succumb to his ruin. How a week had been a boulder he couldn’t nudge and now a month was like a freight train bearing down on him. Was it some kind of gravity that had done that in his youth, that slowed time down till the span of a human life approached eternity and death had no meaning? No, it had nothing to do with physics. It was something infinitely more difficult to comprehend, the passage of a lifetime, for which there was no mathematical technique that might make sense of it. What did physics have to do with human life, except that the one could destroy the other? He remembered how much the stars had meant to him, how his life shrank beneath them even as his soul reached out to them for meaning and understanding. How intrigued he had been as a young professor by the balance between the roaring explosive heat of a star and the crushing implosive strength of its mass. Out there now in the velvet thick of the Milky Way that balance between expansion and collapse was playing out a billion times over above him in the night sky without the tiniest error, each atomic machine working perfectly and patiently, so unlike the people gathered beneath them here on this peaceful night after a day’s hard work. He was like a star, hoping to balance his ambitions and appetites against his moral worth, hoping to avoid the explosion of a nova and at the same time the catastrophe of a stellar collapse, hoping to live on that boundary as long as he could before he burned himself out. How does one ever understand the connection between the cauldron of thought that burns within and the fires of creation that burn without? As he felt the luxury of a heavy warm blanket cover his head in sleep, he thought himself back to his childhood in New York and how easy it had all been, instinctive and sure and so full of promise and he rode through the years on a gorgeous strong horse as words and meaning drifted away.

His eyes wet with recollection, he closed them beneath the shining light in the black sky and turned entirely inward for a few hours of sleep.

The bomb jockeys at Alamogordo were a grizzled, weary crew. Their esprit de corps suffered from a lack of Benny Goodman in my humble opinion. A little dose of Benny goes a long long way. But these guys were not in range of my radio show on KYMI and KYRU where Benny Goodman *sang sang sang* most days of the week. (You got that, right?) The test site was a hundred miles south of Los Alamos. Most of them had come to terms with the fact they would never see it coming if it came. That was a commonplace of war, but there's a difference between a bullet to the brain and being instantly vaporized. To have that hanging over your head all day. And these guys had figured they would never see the war, never be in mortal danger. Instead they ate, slept and drank it as they assembled the gadget. Somewhere deep down inside they also ate, slept and drank the death of a hundred thousand Japanese souls. Some of the guys withered; some prospered; some were oblivious. They lived in a couple of rows of barracks in Alamogordo where the cottonwoods were a rumor that resisted any confirmation. The land was bare and dry. A Kansas prairie windmill pumped water from underground when the hot winds blew and provided some electricity. The place reminded me of that opening scene from *The Wizard Of Oz* minus the hog pen and Dorothy Gale. Bert Lahr would have fit right in. Not to mention Miss Gulch. The enlisted men bounced around in the backs of the transport vehicles and Army brass charged around in their jeeps, Oppie drove down in his Caddy, but this guy Bradbury was in charge, a good man but basically a glorified engineer. He knew enough physics to be dangerous. To be honest it wasn't really all that dangerous. The Ordnance fellows built a

uranium slug that contained the plutonium sphere and inside the plutonium sphere the beryllium and polonium core where the fatal neutrons hung out. That was the dangerous baby right there so, no, you didn't want to drop it on your toe or fling a cigarette butt in its direction, but they didn't drop the slug into the TNT jacket until that morning. Without the TNT jacket the slug was fairly harmless to my mind. Easy to say from a hundred miles away in Los Alamos. It must have been like hanging out in the lion's den or the shark tank, not good for your general state of mind. I was down there a few times to scope out the action and offer a few unsolicited words of wisdom. They were finishing the tower where the bomb would detonate. It was about thirty feet tall, like a lookout tower. (There's a joke in there somewhere, but I can't find it.) That maniac Teller kept coming up with doomsday scenarios as the days ticked down. He even revived his famous We're Going To Set The Atmosphere On Fire routine. It was hard to take the guy seriously. He had this love/hate relationship with the bomb. He feared it and he loved it. It tortured him in some kind of mad scientist way. And if I may be the amateur shrink for a moment: it was because he feared and loved himself. That's not an easy game to play and I don't envy him, but you know how the Jungians say we see ourselves in the world around us. Well Teller saw himself in the bomb. And it was never good enough. It always had a weakness, a flaw. It drove him crazy. He wasn't going to be happy till the bomb was invincible and infinitely destructive. That's what the Super was all about for him in my humble opinion. As he was inspecting the gadget the night before, I saw him standing beside the spherical aluminum casing of the gadget which was ensnared in the thick coaxial cables that connected the high voltage condenser to the many TNT charges embedded beneath its skin. Personally I was thinking the gadget was a kind of Frankenstein's monster with electrodes emerging from its

atomic brains. "It's alive! It's alive!" if I may quote Colin Clive. The guy was a hell of an actor. It was a grisly image but this is how I think. Teller put a hand on the wiring and got a nasty electrostatic shock. I couldn't help myself. I saw him as Captain Ahab standing athwart his white whale, entrapped in the harpoon lines like Christ on his Cross. You have to hand it to that Mr. Whitman. The guy can really write. You know I'm kidding, right? It was Thoreau. Ha! I had an intimation that somehow that bomb was going to be the death of Teller, maybe not the physical death but the spiritual death in some sense.

Chapter Eighteen

Fat Man

July 16. Five o'clock in the morning. I am a groggy irritable man. We are 20 miles away from the tower where the gadget has finally been hoisted into place with the plutonium core nestled into place inside the wired aluminum sphere. There is no hint of sun yet in the sky. Let's get this over with. Then everyone can ooh and ahh and we can get on to the real business of showing Stalin what we are about. Nobody mentions this, but this is really why we must drop the bomb. The Japanese are history. Stalin is the issue.

The bomb jockeys have dropped the uranium slug into place like they are setting a cowboy ever so gently into the saddle of a bucking bronco. Like they've strapped his hand to the saddle horn with rawhide and they are about to fling open the gate of the stall and let 'er rip. The slug looks like a box of nothing in particular, like a cheap radio or something. Good morning New Mexico! Rise and shine! (I sincerely hope.). I know some people are hoping it's a dud.

A bit early in the morning or is it late at night for a pipe, so he smokes his handrolled cigarettes, one after another. He is handrolling them now like a practiced GI, not because he fancies himself a soldier but because it slows him down a bit. His smoker's cough is even interrupting his sleep these days. And also it gives him a minute of peaceful concentration on a simple but delicate task and he needs that twenty forty sixty times a day for his sanity.

He has his back to the view. He will know when to turn around or when to smack his head into the concrete bunker because it's a dud. The gadget looks like something out of *The Wizard Of Oz*, like they're giving the Tin Man an EKG, now that he's got his heart, no that's not right, he never gets a heart, he gets a Testimonial from the Wizard. But that is much the same thing according to Frank Morgan, who is a very funny man, he used to take Jean to his pictures and they would laugh till it hurt. Maybe the Wizard is right. You don't need a heart as long as everybody thinks you've got one. He wonders what has become of his heart since Jean died. It kicked briefly back to life when FDR died. Then it went still again. But this is not the time for that. He's thinking worst case now. What does he do if it doesn't come off? There's only

enough uranium for one lousy bomb. Everybody thinks he has a heart. That will have to do for now.

Look who's here, sir James Chadwick, the guy who discovered the neutron, come to see the damage he has done, god bless him, I hope he's proud of himself. The premise of the betting pool is how many kilotons will the plutonium bomb yield. Oppenheimer took a very conservative position, a 3 kiloton yield. He didn't want to appear cocky. Maybe he didn't want to offend the gods. Bethe came in at 5 kilotons. Rabi put his money on 8 kilotons and Teller because how else would he stick out in a crowd took 40 kilotons. Fermi is being a major madman. He has set up his own alternate betting pool on whether the bomb will ignite the atmosphere and if so will it incinerate just New Mexico or the whole planet. He has scared the living daylights out of the MP's, those thugs. I have no sympathy, even though they are some of my biggest fans on the radio. There is a glimmer of light now in the east. Most of them can't see it because they've got their welding goggles on. They were told they might go blind from the light. I am a cool customer I am handing out suntan lotion to break the tension that is evident in most of the party on Compania Hill. Perhaps the sun will never rise today.

There is no warning. There is just light, light everywhere. He thinks of Arjuna on the battlefield seeking enlightenment.

Holy mother of God. The damn thing works. The light is pure white. It feels like it's inside your head like Benny Goodman is inside your head when you listen with headphones on, Krupa to one side banging on the tom-toms, the horns on the other and Benny in the middle playing every note in God's creation and they are all perfect.

I stand up. I wear no goggles. I look right into it. The pain of the light is intense for the briefest part of a second but it's nothing I can't take. It's like the primordial light of the universe. It is everywhere. It is everything. It condenses into a cloud that rises and rises majestically. My god it is beautiful. Only I have the nerve to look it in the face and take it for what it is. Only I truly see it. I am filled with pride. My heart swells. If might makes right, the bomb has just become the absolute truth. If right makes might, then we have manufactured victory from First Principles. Either way, God bless America. And God bless the atomic bomb.

Now he knows a hundred thousand people who were going to be dead in a couple of weeks.

Rabi is thinking he is about to witness eternity. And that His ark is become a 30-foot tower. His desert is New Mexico. He is again, as He was in ancient days, a pillar of fire by night and a column of smoke by day. And we shall carry him out to do battle with our enemies. And all of Canaan will fall to Yahweh. *Shema Yisroel, Adonai Elohenu, Adonai echod.* Hear O,

Israel, the Lord Our God, The Lord is one. The very words in his head are muted by a devastating assault of sound and a mighty wind that rushes over the desert.

And it came to pass on the third day in the morning, that there were thunders and lightnings and a thick cloud upon the mount, and the voice of the trumpet exceeding loud, so that all the people who were in the camp trembled. And Moses brought forth the people out of the camp to meet with God, and they stood at the nether part of the mount. And Mount Sinai was altogether in smoke, because the LORD descended upon it in fire; and the smoke thereof ascended as the smoke of a furnace, and the whole mount quaked greatly. And when the voice of the trumpet sounded long and waxed louder and louder, Moses spoke, and God answered him by a voice.

And God spake all these words, saying, I am the LORD thy God, which have brought thee out of the land of Egypt, out of the house of bondage. Thou shalt have no other gods before me. Thou shalt not make unto thee any graven image, or any likeness of any thing that is in heaven above, or that is in the earth beneath, or that is in the water under the earth. Thou shalt not bow down thyself to them, nor serve them. For I the LORD thy God am a jealous God, visiting the iniquity of the fathers upon the children unto the third and fourth generation of them that hate me, and showing mercy unto thousands of them that love me, and keep my commandments.

Oppenheimer did not get up. He barely lifted his eyes to meet Izzy's gaze. He was in the armchair by the window but the curtains were drawn and the lights were not on.

"Are you sitting *shivah*, Oppie?"

He smiled the faintest of smiles. "Izzy, how good to see you." He was already lying, wasn't he? Maybe he wasn't. Maybe Izzy could be of some help, although he couldn't imagine how.

"How are you feeling, old man?"

"Please, Izzy. No direct questions. Not this early in the day." Was it early? He wasn't really sure. Psychologically it was the raw dawn of a night with little sleep.

Rabi noticed the reconnaissance photos on the coffee table. They were arranged neatly, fitted together like a puzzle he had solved. "Mind if I open a curtain?" he asked.

That was better, an indirect question. "Please do," he said and the light fell on the photos. "Have you seen them?"

"I've seen a few," Rabi replied and looked at him more carefully. He wore no tie and went barefoot, no belt on his trousers, as if he had given up halfway through the task of dressing.

"Have the others seen them?"

"Oh they all came running."

“What did you expect, Oppie?”

“I don’t know what I expected. I didn’t expect this.” He was looking at a photo of a vast expanse of wreckage coated in thick white presumably radioactive ash that had fallen from the sky and blanketed the city in a death of snow. There was a road slicing through the ashen silence of the photograph and running down both sides of the road were the charred remnants of telephone poles like burnt arms thrust up from the earth begging the skies to stop.

“The Romans would set up a mile of crucified soldiers along the road leading into a conquered city. They groaned and died and rotted there till they cut them down.”

“Oppie, there is no need...”

“They look like crucifixions, don’t they, but where are the bodies? They have blown away on the wind. No need to cut them down.” He placed a hand on the slick finish of the photograph and let his fingertips rest on the destruction of Hiroshima. “What have we done, Izzy?”

“I don’t understand you, Oppie. Did you think it would be otherwise?”

He had thought oh well there will be a blinding flash and a fireball, as they say, but we will be far away watching it from a bunker on a hill. Had it really not occurred to him how it would be when there was a city and not a desert beneath the cloud? “Maybe I pictured London during the blitz. This is not the blitz. This is unspeakable. This is insanity.”

The next one was of a road running across the scene and behind it three tall black bare trees with powerful roots gripping the earth from small hillocks that stood out where the rest of

the soil had been blasted away by the explosion. The one in the middle was tallest and nearest.

“This one looks like Golgotha. Like the version by Tintoretto. Have you seen it?”

“No I don’t think I have.”

“It is heartbreakingly beautiful.”

“Is it?”

“There’s also a good one by Altdorfer.”

“They are supposed to be about redemption, aren’t they? Can you see some kind of redemption here?”

“No, Izzy. I see nothing of the kind.”

“Maybe you will in time.”

“Teller was here. He could barely contain his excitement.”

“They are calling you a hero, Oppie. You ended the war in one fell swoop.”

“I called an assembly. ‘The War is over.’ I walked in like the heavyweight champion of the world. With my hands clasped over my head. Can you picture that, Izzy? That is a scene I would like to erase from my mind. Sometimes you can’t see your hand in front of your face. I mean ethically.”

“Stop, my friend.”

“How did I not see this coming? I must have been willfully blind.”

He was examining the next one, two women with folded umbrellas walking down a wide asphalt street after a rain. The roadside rubble seemed to be washing up on shore from a sea of devastation on either side. He wondered where they were going. “Maybe they are going to visit relatives in Nagasaki.”

“You see what you are doing? You have to stop this mea culpa.”

“Groves was here. He shook my hand so hard I nearly cried out. He said one of us should run for president and the other could be his VP and fuck that tailor Truman. He said FDR was an architect. This guy is not even a carpenter.”

They sat in silence for a few moments and he sank into thought. He surfaced for a moment to ask Izzy if he wanted coffee or maybe tea. Izzy said tea would be nice, but he did not get up.

“This one, Izzy.” He pointed to a photo of a stone temple that had been reduced to chunks of rock and a Buddha who sat among the ruins. His serene stone head was burnt black. He held a scorched palm frond in his right hand. “Look at the peace on that face. See how he is tipped forward? Is he about to fall over or is he bowing in reverence to a greater deity?”

Rabi looked closely. “He could also be The Man In The Iron Mask.”

He thought, yes, that’s me, my face locked away from the world as I gaze upon its destruction.” He said, “Remind me how the story goes.”

“His enemy has stolen his identity and locked him in the mask so he cannot prove who he is, but he finds the mask useful as he enacts his revenge.”

“Yes, right.” And who was the enemy who would steal his identity? And what would be his revenge?

“Do you know the Book of Job, Oppie?”

“Of course I do.”

“Have you read it?”

“Do I have to read it to know it?”

“It helps.”

“I think I read it somewhere along the line, don’t ask me why.”

“You see you are like Job. Look at you. You are in sackcloth and ashes. You scrape your sores with pottery shards. God has punished you, his favorite son.”

“Has He?”

“A messenger has come. Three messengers. ‘I alone am escaped to tell thee.’”

“Yes I remember that. So I must have read it.”

“And what did they say, Oppie?”

“Everything you had is gone. Your family, your fortune...”

“That’s right.”

“Your reputation.”

“Yes. And Job asks, why has God done this to me.”

“Izzy, the question as I remember is this. Did Job love God because God was good to him? Or was God good to Job because Job loved God?”

“Yes, there you have it in a nutshell. God was not sure which way it was with Job.”

“He lacked confidence in Job.” That got a smile from Rabi.

“So He tested him to see what might happen. You know, Yahweh is not like Jesus, Oppie. He is an old-fashioned God. He cannot look into your heart. He can only see how you act. So he tests you.”

“So I am being tested?”

“It seems so.”

“And what is the test?”

“I think you know.”

“But I don’t believe in God like that.”

“But you can still be tested.”

“In what way?”

“Do you love life because life has been good to you or has life been good to you because you love life?”

“Maybe it’s a coincidence, Izzy.”

“Ah, you have rejected both answers and you propose a third. Now that is Talmudic thinking, Oppie.”

“How is that Talmudic?”

“The rabbis of the Talmud were more highly evolved than we are. They were focused on the questions. They were humbled by them. They knew there are no answers.

“Rebbe, forgive me but this does not sound like the Orthodox line on the Book of Job.”

“I am not that kind of Rabbi, my son.”

“But why did God give me this bomb to build, why did he make me the architect of death”. Me, his favorite son. “And when I say God you know I don’t mean Yahweh, I mean something else.”

“One of the points in The Book of Job is this: nobody knows why God did it, so nobody knows what to say to Job.”

“Ah I see. They all get it wrong. You are to infer it is a mystery. Is that it, Rabbi?”

“You are to infer there is something wrong with the question, my son.”

“But God answered him out of the whirlwind, did he not?”

“He did.”

“And what was his answer?”

“He said stop questioning my motives and humble yourself before me.”

“I don’t know how to do that, Izzy.”

“Who does, Oppie? Who does?”

Rabi got up to go and said he was leaving Los Alamos and hoped he would shut the place down and get out as soon as he possibly could, but he could hardly look up to meet Rabi’s gaze.

“You must stop looking at them, Oppie. This does you no good.”

“I wanted it so badly. With every breath in my body. I let nothing get in my way. This kind of desire is a sickness.”

“I say this out of respect and love, my friend, but you sound like hell and you look like hell. You have lost twenty pounds. Your coughing is non-stop. You must rest. You must find peace. You must get well. We need you, Oppie. You are still in charge. You have the moral authority now, not Groves, not Truman, not Teller, none of them have it. You have it. I want you well so you can use it wisely.”

“We were like a monastery of Tibetan monks who were assembling a mandala grain by grain. Have you ever seen them, Izzy?”

“Yes I have,” he replied, his face gone blank.

“Forgive me, Izzy. I hear you but I have to speak. I don’t know any other way.”

“Tell me about the mandala.”

“Did you know they assemble them one painted grain of sand at a time? It takes years and years to get one done. And then it’s done and it’s big and beautiful and it’s filled with the

iconography of Tibetan Buddhism, it might be the Seven Bardos or the Wheel of Time or the Eleven Faces of the Bodhisattva all laid out and beautifully designed, as beautiful as a Michelangelo or a Titian. And then the monks all come together for a ceremony and they admire the mandala and chant over it and bless it. And when they are done, they blow it away with their combined breaths and it is gone as if it has never been. Because it is the temporary illusion of the material world that they are looking at and it has no real meaning. Maybe that's why we built the bomb, Izzy. To blow it away. To remind ourselves the world had no meaning. What does it matter that we incinerate a hundred thousand civilians along the way?" His mouth was thick with the taste of ash from his cigarette.

"Oppie, I listen to you and I hear you say these things and I fear for your soul. You know we bury fast in the Jewish religion. We put the body in the ground and we say our goodbyes. Please my good friend, you must put the body in the ground and say goodbye."

"Maybe this is why God made the world, Izzy, so we could destroy it because He knows it has no meaning."

"I hope you are wrong, Oppie, but I fear you may be right."

Two thousand years ago I tried to save mankind from the mess I created. I sent myself into the world to be their savior. But what a stupendous disaster. How little they learned. How little they changed. I gave them my SON. And what did they do? They massacred my chosen people and they created this abomination they call Holy Mother Church. Fine I'm done with them. You cannot say I didn't try.

Now I am returned. I am incarnated again as a plutonium core encased in a jacket of TNT that is sculpted to perform a spherical implosion. I have come back to destroy what I created. I was wrong to think a divine soul could prosper in this material world. In my arrogance, I gave them an impossible task. I relieve them now of their responsibility to live here in righteousness. It cannot be done.

If this doesn't work I have other means. I can poison their climate. I can send a plague. I can raise up a despot. A madman who would take it all with him when he dies.

Rabi got up to go. He didn't want him to leave. He needed to say the one thing he had not been able to bring himself to say.

"I feel a tremendous sense of sin, Izzy. I have blood on my hands."

"If not you then another man, Oppie. Your sin is not murder. Your sin is pride."

"Pride?" He was incredulous that Rabi would say that. "Pride that I wanted the glory?"

"Pride that your leadership would be necessary or sufficient. The bomb was unstoppable. You did not make it. You could not have prevented it. That is the lesson we have learned. That I have learned at any rate."

But he knew he would be punished. He knew he could not escape it.

When Rabi was gone, he looked again at the stone Buddha. Who was he inside his own stone mask? Was he a conquering hero? Was he a pious fraud? Was he a craven war criminal? Would he ever show his true face to the world or even to himself? He threw away the other

photos and kept the Buddha. He lay down on the couch and felt the tears sting his eyes. *O, my offense is rank. It hath the primal eldest curse. Pray can I not.* He gasped in shock at the pain in his heart and began to weep and he shook with weeping that rose and fell till he was weak from it and it subsided for the time.

He was sailing down a river in a small boat in the night. The creak of the boat was comforting. On both sides of the river, long white houses were lit from within with warm yellow light. He knew the way one knows in a dream that this one on the left was where the party was. He walked up the lawn and entered through French doors. She was standing in a crowd at the far side of the room. She turned to look at him. He thought he heard her say his name through the din of conversation.

Just for the record and for the sake of the story, I should mention that on this day in 1946, I revealed my second coming to a sturdy Egyptian shepherd in Nag Hammadi. I am referring to a trove of documents that elaborated the truth about who I am. They are sometimes called the Gnostic Gospels. Genesis makes it all sound so simple. God spoke to Moses. Moses heard God. Moses wrote down what he heard.

And God said, Let there be light. And there was light.

And God saw the light, and it was good; and God divided the light from the darkness.

It's a nice story, but no. You cannot imagine how long the calculations took me. For a long time I thought I might do it with one force only or two at the most, which would have been hard enough. And when I say "time" I of course refer to something that did not then exist, something I was then creating, or rather I should say discovering because it was really a happy (ironic that) byproduct of my efforts. I had thought in some vague way to place it all in some unexplained now without past or future, but that neverending present gave way to the long, abysmal stretch of time that rose up out of my calculations and devoured it. I found I required complexity to make a man. I needed four forces, not one. And I needed time. I wanted something that would surprise me with an almost incomprehensible beauty.

But there was another story they told themselves as they became more aware. It was written down two thousand years ago in the aftermath of Jesus' coming and going and then buried in an Egyptian cave for two thousand years, until they were really ready to hear it. That is when the good shepherd stumbled across the texts.

When the light had mixed with the darkness, it caused the darkness to shine.

And when the darkness had mixed with the light, it darkened the light

And it became neither light nor dark, but it became dim.

Yes, that's good, a closer approximation of the Light that I created for them. And of themselves they first wrote in their Book of Genesis

And the LORD God formed man of the dust of the ground,

And breathed into his nostrils the breath of life;

And man became a living soul.

Yes, that's very sweet, isn't it? They were like children in those days, so I told them a children's story. I was their god. They bowed down to me. They wrote a book, their geniuses, their madmen, their poets, their scribes, and in it they worshipped me, a very messy book, no discipline to their writing. Well, what would you expect? I do not admit of simplicity. Eventually they saw themselves more clearly and they saw more clearly their place in my Creation.

In that moment the angels became jealous, because he had come into being through all of them and they had given their power to the man, and his intelligence was greater than that of the angels who had made him, and greater than that of their God. And when they recognized that he was luminous, and that he could think better than they, and that he was free from wickedness, they took him and threw him into the lowest region of all matter.

Even better. They were growing into the truth of their being. I had given them wit so they could gaze upon my creation and be enlightened, and instead it has driven them to the brink of madness. So you could say, yes, I did surprise myself but it was not a happy surprise.

It is one thing to find your way to God. It is another thing to return unharmed.

You think it is easy to create a world? It is not. You think it is easy to destroy it? That is much harder.

Part Two

Teller In His Own Mind

The magazines and newspapers were saying all kinds of provocative, beguiling things about the man. He was Prometheus who stole fire from the Gods for the benefit of mankind. He was Aladdin who let the genie out of the bottle. To the naysayers, he was the Dr. Jekyll whose potion transformed us all into Mr. Hyde. The guy had press like nobody has ever had that kind of press. He was a warrior saint, a holy knight of the realm. *He bestrode the narrow world.* And I disappeared off the face of the earth. He sat on the Atomic Energy Commission. He carried letters to Washington signed by every Tom, Dick and Harry who had a scruple about the bomb, written in tortured, academic prose, extolling the New World of Peace that he envisioned (Peace In Our Time, but he dared not say that!), claiming the high ground of nuclear restraint, promoting some halfbaked nonsense about the Freedom of Scientific Endeavor, the Free Flow of Ideas being necessary for the well-being of our intellectual community, advocating the return of the scientists to their status quo ante when they devoted their lives to determining how many quantum angels could sit on the head of a hydrogen atom without violating the Pauli Principle. (Pauli, by the way, don't get me started on Pauli.) He testified, he advised, he labored, he jawboned. He offered me the Directorship of Theoretical at Los Alamos now that Bethe was returning to Cornell, and I said Yes of course now you want me for Theoretical and I will take the job under one condition, that we go full speed ahead on the Super, fusion research, fusion

experimentation with deuterium and the propagation of tritium from lithium in a uranium reactor, and the design of a thermonuclear weapon based on the implosion principle of the plutonium bomb. Ulam and I are chomping on the bit, Oppenheimer, just give us the word and we will dive in headfirst, and he said, Under no circumstances will I authorize the research of a fusion bomb at Los Alamos and who are you kidding anyway Edward, there is no money for fusion research now, this isn't the Army anymore down here at Los Alamos with an unlimited, secret wartime budget, this is a civilian institution now that gets its money from Congress when and if they see fit to allocate funds, do you have any idea how hard it is to get Congress to allocate funds for science? So I said screw you, Oppenheimer, I don't need Los Alamos any more than you do, and I packed my grand piano and my wife and child and one on the way and I went to the University of Chicago to work with Enrico Fermi, and I put away the bomb, well I didn't exactly put it away, but I went back to pure atomic research and I thought and I wrote and I published extensively. What did I write about? What do you care? You wouldn't begin to understand. Ok for the record. I went back to my previous love, the quantum mechanics of electron bonding in molecules. And I investigated the nature of cosmic rays, the most powerful radiation that nature creates, radiation that comes from enormous distances away in the universe, created by incalculably powerful energy sources I could only guess at, rays which bathed the earth relentlessly with destructive energy, a subject I find compelling.

I busied myself and I hoped for the best. I spoke of world peace. I was no different from any man. I wished to be done with wars in my lifetime. I expressed some enthusiasm for the peace initiatives, the white papers, the petitions, the colloquies but please. I am no fool. I have lived through the first half of the twentieth century. I do not harbor any illusions about the

nature of violent human endeavor. It is in us. It is at the core of who we are when we come together in nations. And so I hibernated scientifically and politically on Chicago's South Side in Hyde Park. But I continued to think about fusion and the bomb. I tinkered. I toyed. I said Fermi, let's get back to work on the bomb, the real bomb, the one we need to stay ahead of the Russians, and Fermi god bless his humble soul, he said it's an interesting scientific challenge, Edward, yes, I like that, let's get to work. Can you believe that? Interesting scientific challenge. It was not an interesting scientific challenge. It was the necessary and sufficient condition for the freedom of mankind. It was the only hope we had. And I was happy for a time.

Let me tell you about the hydrogen bomb, describe it to you in detail, chronicle its painstaking, skullcracking complexity. Let me sing of bombs and the man. It starts in Los Alamos after the War when they gave me access to ENIAC. They transported the monster from the University of Pennsylvania where it had been invented by Mauchly and Eckert and isn't that a sad and telling tale how they lost the patent on the electronic computer, the patent that would have made them the richest men in the world, because von Neumann outwitted them with his claim that they had put it all in the public domain, of course he did, he had to, how else could get down to the business of inventing his own computer, the task he had been planning since we solved the plutonium bomb with those ridiculous IBM 601's, but that's another story, and they brought ENIAC by boxcar to Aberdeen, Maryland and they hammered and soldered and wired it back together, the whole hulking thing with its thousands upon thousands of vacuum tube resistors and capacitors, its accumulators and its quick electronic memory, row upon row of tubes and plugs with thick coaxial cables slithering off the wall like electric eels, goldplated wires in thick bundles, rows of dials from zero to nine where data was entered one decimal place

at a time, each complex circuit connected to a small light bulb that stayed on when the circuit was functioning and winked out when it short circuited so we knew at a glance where the trouble was, and there was always trouble, and Mauchy and Eckert muttering and fulminating like alchemists over their cauldron because the damn thing couldn't add two plus two without their constant cajoling and persuasion, it was their brain, an extension of their mathematical skills and only they could make it work properly. It filled a huge room that had been prepared with steel reinforced flooring. It ate electricity like it was candy. The whole town browned out when it was thinking hard. And we thought it hard. This was back in late '45 when Los Alamos had not yet given up the ghost and Ulam and I were coaxing every last inch of science out of it in search of nuclear fusion. Like rats from the sinking ships, scientists were skulking back to academia, but we pressed ahead with impossibly complex calculations that only ENIAC had a ghost of a prayer of handling.

In the same way we used a sphere of TNT to compress and trigger the plutonium bomb, we were going to use a sphere of uranium to ignite the hydrogen in the hydrogen bomb. The atom bomb was like a voice crying out in the wilderness, "Make straight the way of the hydrogen bomb." Or should I say, "make spherical"? There was the initial fusion reaction that had to be calculated, and then as if wasn't enough there was also the production of charged particles that could either dissipate energy or pour themselves back into the fusion reaction. That had to be factored in somehow. There was also the heating of electrons which can kick back into the fusion reaction and stoke it further or absorb heat from fusion and tamp it down. That had to be factored in. The electrons can also slow down and radiate energy away or they can radiate that energy back into the fusion process. That had to be factored in as well. All of this at one and the

same time. Are you getting the idea that this was too complex for the human mind? Maybe too complex even for ENIAC? We did not know but we decided to find out.

So we broke down the fusion process into increments of one ten-millionth of a second and we tried to calculate the damn thing one ten-millionth of a second at a time. But god it was a mess. We were juggling too many inputs and too many outputs to get a handle on the thing and we used a million punchcards along the way. We decided in the end that we needed a bigger and better ENIAC and our project would have to wait. For some idiotic reason we were patient. We felt we could wait. We didn't know we were already at war, locked in deadly combat with the brutal Russians, who got no nuclear scientists out of their occupation of Germany although they got a bunch of rocket scientists, but they had their ace in the hole, Klaus Fuchs the traitor who gave them the specs for the uranium and plutonium bombs, Klaus my student who came with me to Los Alamos from the University of Chicago. I'm not sure who I hate more, Klaus Fuchs or Adolph Hitler, but I think it might be Hitler because Fuchs, god damn his traitorous soul, he came up with an idea way back in '45 or '46 that involved using radiation from a uranium bomb to compress the hydrogen in the hydrogen bomb, a strange and odd idea at the time, but when the sheer explosive force of uranium proved to be an impractical way to ignite the fusion reaction, radiation proved to be the answer to the H bomb in the end. How's that for irony, Klaus, you bloody communist bastard?

So I wrote up our results as a brilliant paper, a magnificent paper which could serve as a roadmap for the hydrogen bomb, and what did they do with it? They ignored it utterly. And those who bothered to read it said it was too optimistic, that it was a pie in the sky paper, their idioms escape me, and a Rebecca of Sunnybrook Farm paper, which apparently had something to

do with Shirley Temple, the child actress but what do I know about that. So ok. It was upbeat. It was hopeful. It ended with the minor caveat that we did not yet have an atom bomb that could achieve the necessary yield to trigger a hydrogen bomb. And Oppenheimer, what was his response? I'll tell you exactly what was his response. He was relieved! He was very nearly *happy* that we had said the bomb was not yet within our reach because the bomb was an evil thing, Edward, get that through your thick skull. Very well, Robert Oppenheimer. If the hydrogen bomb is an evil thing, then I am an evil thing. And therefore I disprove your proposition by contradiction. Quod Erat Demonstrandum.

But the Russians had invaded Czechoslovakia. Mao had conquered China. Berlin was besieged. The lights were going out all over the Europe of my psyche. How could I think about science? I lost all interest in molecular physics and cosmic rays. I couldn't summon a coherent scientific thought. I began instead to infiltrate the halls of power. I realized the politics of the bomb were as important as the science of the bomb. But I got nowhere and Oppenheimer was everywhere. He had their ear. I had their complete indifference. I was exhausted.

I never got up easily in the morning as everyone at Los Alamos will tell you. But now I gave up on the morning altogether. The brightening of the morning sky overwhelmed me with anxiety and black thoughts about the opinions of others. I waited for the blaze of day to rouse myself when the guilt of lying still in bed became worse than the fear of rising to the day. I seemed to grow smaller and heavier. My brow thickened. My tongue grew slack. My teeth ground down and I began to feel there was a curve in my spine in addition to the limp in my walk as if the weight of my life were pressing down on me like the world on Atlas' shoulders. I loped. I walked on my knuckles. I ate only low-hanging fruit. Half man half beast, I was

captured by darkness and imprisoned in a dungeon of my mind where the candlelight watch of my captors was the only light that penetrated through cracks in the massive wall.

Then my interrogation cell was flooded with a stinging white light that made sleep impossible, that irradiated my brain with cancerous lesions, that confused my alibis and confounded my confessions. The bright malevolence of this torment wore away at my higher faculties and nurtured the animal half.

I carved a manifesto into the walls of my cell with the blunt tip of a rusty nail.

I am not evil.

It is the world that is evil.

It is the world that must be neutralized not me.

It is the delusion of *fraternité* and *égalité* that makes you as dangerous as the barbarians at the gates, Oppenheimer. Never negotiate and when you do negotiate from strength. Overwhelming advantage is what you need to deal with the Russians and their disregard for human life, their willingness to sacrifice entire armies mustered from legions of young men who spring from the soil of the vast steppes fully armed and ready to die for the glory of Mother Russia. Do not fool yourself into thinking the world wants peace. The world is made of war. That is the force that holds it together on its atomic level, the binding energy of war. The world has an appetite for death. It eats death to live. So do not come to me and ask me to appease. Do

not ask me to share. Do not ask me to stand down. Nor to give the benefit of the doubt. I have no doubt. We must bring them to their knees. Though you take me for dead and throw me into the sea, I will return to enact my revenge.

Signed this unknown day of my confinement in the Chateau d'If of my misery.

Edward Teller.

Physicist.

The children irritated me. My wife irritated me. The bed terrified me. In it I could only lay awake in a straitjacket of insomnia. The piano was my only solace. I sat for hours playing in the minor key. But it was not play. One night I sat at the piano playing E minor chords, every variation on the E minor chord I could find on the keyboard. I grew enraged. I pounded them into the keyboard. I sank them in like a knife into a belly. And when I'd had enough of that, I played them tenderly, touchingly, pianissimo, almost beyond hearing, each one lingering in the air and then slipping away to make room for the next, a soundtrack for the black mood of my life. And I plotted my escape.

I had to get away. I said I needed to get away, to take a vacation from work, from the family. I went to New York City and checked into a hotel with a view of the Empire State Building. I stood for hours at the window looking out at the teeming metropolis. I lost all sense of who I was and why I was there and I opened the window and leaned out over the sill. I came that close to the unthinkable. I imagined myself floating out the window. I imagined the

enormous release of falling, of letting go. What saved me? I am not sure, but I think it was the wind fifty stories up. It struck me full in the face and brought me to my senses. The lights of the Empire State Building were the most beautiful thing I had ever seen, stately, solid, lifting up above the skyline. They somehow gave meaning to the chaos of the city and the chaos of my life. My mind cleared and I lay down and slept for two days. It was the vacation I truly needed, but it didn't last. When I got home, I sank deeper and deeper into sleep, into fantasy, into nightmare. I grew suspicious of my colleagues as I feared they had grown suspicious of me.

And then we got word in '49 that the Russians had exploded an atomic bomb, I think I may have gone mad for a moment. I may have smashed a wall or two. I may have stomped on a child. I'm not entirely sure. I got Oppenheimer on the phone and I raged.

"I told you this would happen. What have I been talking about? What have I been saying? While we piddle around patting ourselves on the back and making little tweaks and adjustments to our timid A-bomb technology, the Russians are breathing down our necks! Did I not say this would happen? We are now at risk, Robert. We have put ourselves in harm's way! You have put us in harm's way with your soft sell and your go-slow and all your pigheaded idealism about the morality of the bomb. The bomb has no morality. It has no right and wrong. It has winners and losers. Conquerors and those who are conquered. It borders on dereliction of duty to say otherwise and you know it!

"Edward, keep your shirt on!" he shouted back at me on the phone. I could hear the exasperation in his voice, but I understood it wasn't exasperation with me. It was exasperation with this entirely predictable turn of events that I had been carping on since day one and they all

said pipe down, Teller, keep your powder dry, but here I am a prophet without honor in my own country. A Jeremiah no less and they have thrown me down the well. They had better come haul me out if they want to be ready for war when the battle is joined.

I said, “Are you with me now, Oppenheimer? Are you ready to get back to work on the Super?”

“This is not a weapon of war, Edward. This is a weapon of genocide.”

‘Oppenheimer, you gullible fool, the whole time they have been demanding that we dismantle our bombs and forswear nuclear war, **THEY HAVE BEEN BUILDING THEIR OWN!**’ I fairly screamed into the phone.

“Goddammit, Edward, don’t you see there is a limit to what you can destroy and still call it victory. The hydrogen bomb could wipe out entire nations. All human life. The whole planet. Do you want that on your conscience?”

He can be very eloquent, very clever with words, very persuasive to like-minded people, but not to me. Not to me, J. Robert Oppenheimer. That was a phone call I could not forget. That was a phone call that stuck in my gut for many, many years. I simply could not fathom the man. And I say that with respect and love. I respected and loved him. But I also had a healthy dose of suspicion. Suspicion of what? I do not know. But I was bound and determined to find out. And so the hydrogen bomb began to consume me again, to keep me up at night. And so did Oppenheimer. I stepped out of my prison cell a free man and I went to work and beautiful ideas began to bloom. There is nothing like a mortal enemy to concentrate the mind.

Exit Szilard, Stage Left

Leo Szilard wept and raged. He wrote and cabled. He did not bathe. No tub could hold him. A bomb had been falling out of the sky for thirteen years and finally it had landed. Which theoretically sounded like a brilliant achievement, but was in fact a travesty of justice. It did not land on Hitler's well-deserving Germany. It fell on a land of barbarians who gave no thought to atomic weapons. It was the worst possible outcome. Truman had made the world safe for nuclear war.

Advanced Study

He arrived in the humid heat of a Princeton July in '47. An afternoon thunderstorm drenched the Cadillac and flooded the windshield beyond the ability of the windshield wipers to maintain visibility. He pulled over on Washington Street and waited for the storm to relent, which it did rather quickly giving way to clear skies and the sweet scent of cut grass. He rolled down his window and inhaled. "Kitty, I think this might be the antidote to Los Alamos. Rain. Civilization. Look at that magnificent thing," he said pointing to the University Chapel. Is it Catholic?"

“They are all High Church Episcopalians here, darling. Their eighth deadly sin is poor manners.”

“I think we turn left at the traffic light. It’s the only one in town.”

Left on Nassau Street, he passed Nassau Hall where the ivy climbed the old beige brick of the long three-story edifice and the long white mullioned windows ranged evenly across the façade with an architectural precision that said, “Yes we know what we’re on about here. We have nothing to prove.” The unfortunately large steeple that sat on top of the building could be shrugged off as the triumphalist gesture of a day long gone. He could easily imagine the frocked ministers simmering away at God’s work on the walkways, in their spartan classrooms where the difference between a lecture and a sermon was hard to discern, at their candlelit desks where they explicated God’s Word for the good of mankind, where they sought to reconcile fierce and ironclad doctrine with the wayward human heart, and in the solitude of their iron bedsteads at night with sleeping gowns and stocking caps, bedpans and chamber pots. Including Jonathan Edwards, among so many others, who named us sinners in the hands of an angry god, got himself elected President of the University and then died of the pox, but they say he got it from an injection. Would they not be aghast at the blue-blazered, rep-tied, khakis and brogues young men of wealth and privilege who passed through Princeton now with an eye on Wall Street and the fortunes that could be made in the selling of stocks and bonds? If there’s an irony in that, it did not come to mind. Would Edwards understand the cultural evolution that had led his flock from God to mammon, the inevitable cultural degeneration that would someday require a new religious awakening like the one he preached of, against the wealth and privilege of his own day?

Left again on Olden Lane. Graceful, mottled sumacs, graveled driveways, old colonial homes set close to the road, lawns, gardens, wooden fences, cobblestone curbs, expensive cars, no one in sight. The street was running with rainwater from the storm. He pulled in at 91, home of the Director of the Institute for Advanced Studies, and that was he, and this his new home. The sting of hot summer after the storm was already back in the air as he opened the car door and looked at the house.

Mornings at 9 am he finished his bacon and eggs breakfast, had a smoke at the breakfast table overlooking the garden where Kitty was already on hands and knees planting, pruning and weeding, put on his suit jacket, tightened the knot of his tie in the silvered mirror in the entrance hall and walked the couple of quiet blocks to Fuld Hall, which was the Institute's distant but direct descendent of Nassau Hall, in which you could see all the family resemblances inherited by the secular deep thinker of the 20th century from the devout religious thinker of the 17th century, the proud façade, the prominent steeple, the wide-eyed windows, the patient lawn. When you read between the lines of a text by Niels Bohr, newly arrived at the Institute like Oppenheimer, you heard the same intimations you heard in Jonathan Edwards' texts. "This is how the world works. I have it on good authority. You may trust me. I will not lead you astray."

His own dress was at one end of the spectrum, worsted wool suits from Langrock's on Nassau Street, bespoke, perfectly fitted, long, draped, double-breasted, a silk tie, a silver tie clasp. He thought himself impeccable. On the other end was Einstein, whose shabby sweaters and baggy wool pants were a point of pride, inimitable, like the wooly unkempt mane of electrified white hair he cultivated on his aging head. Einstein was an enigma to him. So brilliant so young, so elastic of mind, so unafraid to overthrow the paradigm and now so

seemingly trapped in a misguided conservatism that fought against the quantum revolution in favor of the *ancien régime* of classical physics. Someone had quipped to Time Magazine that Einstein was a landmark and not a beacon. They all thought it was he who made the unkind remark, but it was not him. That was one small example of the notoriety that seeped into every corner of his cultural, intellectual and personal life, not to mention his political life.

From his corner office on the first floor he had a pleasing view of the forest of maples, elms and dogwoods. He had been delightfully surprised in the late October autumn when the tall maples turned red and gold and the dogwoods growing beneath them turned crimson and again in the spring when the white flowers of the dogwoods blossomed beneath the green maples. A long grass field led down to a pond at the edge of the tree line. When the air was fine, when he was stuck, when he was agitated or excited, when he simply needed to move, he walked down to the trail that led into the forest and hiked at a determined pace to the river where a small bridge made of wood and wire spanned the water. This was a kind of sanctuary away from sanctuary. He sat on the swaying bridge suspended by cable over the shallow silty river, moving so slowly a single leaf took minutes to pass beneath it, like watching a lifetime pass by, a solitary leaf afloat on the river. He wished for the peaceful mindlessness of that leaf, for its patience with the world, for its surrender to the river, and for the river which flowed almost imperceptibly, so close to stillness, to hold him up and let him float on its surface as long as he may.

Einstein's office was on the second floor. Bohr and Dirac were neighbors on the third. Von Neuman was in the basement in the boiler room.

“Show it to me, Johnny,” he said, standing in the doorway. He had to duck under the metal doorframe and swerve to one side to avoid the row of fluorescent lights that hung from the slightly damp concrete ceiling. The place stank in a way that was hard to identify. It had to do with the continually sweating pipes, the rare electrical fire that happened god knows how, the acrid odor of solder, the unavoidable basement accumulation of must and mildew, an oil slick or two and the heat radiating off the surface of the cast iron boiler. Taken together the overall effect was to induce in the visitor a sinus headache, stinging eyes and a sharp itch in the nose. As for the smell itself, it was nauseating.

“Oppie, I know what you’re thinking but you’ll just have to get used to it. Everybody does.”

“Talk fast, Johnny. I don’t know how long I can last.” He reached for the pack of Chesterfields in his shirt pocket.”

“Oppie! No smoking! It’s not safe.”

“Sorry. I should have guessed.”

“The point is this. It can do an addition in 60 microseconds and it can do multiplication in 700 microseconds.” Unlike the quaint IBM 600’s that were built into small tables like overgrown sewing machines, von Neumann’s computing machine was a massive rectangular construction about ten feet tall and fifteen feet long. It was powerful, forbidding, dangerous and unknowable. Like the altar in the Philistine temple where the priests sacrificed to Dagon. “You see this set of vacuum tubes. This represents a number. This tube is the ones place. This tube is the 2s. This one is the 4s and etcetera. And we store another number here. They are added

together electronically here in this circuitry and we get the result in this set of vacuum tubes here. We place the result in this set of circuits which we call the computer memory and do another calculation. We can retrieve a stored result and add it to another stored number and get a further calculation. And here in this assembly we store the sequence of calculations we want to perform and the computer executes them one by one.

So much for the philosophers who say that thoughts are formed in the mind and then attached to words that are thought back into the mind who hears them. Where is the mind calculating here? There is none. Thought was being created and transmitted without the benefit of any human being. Maybe that was why he was so crankily put off by this basement. As if his teenage son were making out with girls in the cellar. He couldn't really disapprove. That would be hypocritical. But was this how he wanted his children to grow up? Was this what he wanted going on under his own roof? What if the neighbors found out?

“You see it is a huge leap from Mauchly's ENIAC. It stores information but it also stores a set of instructions to operate on that information, which it executes one by one.”

“And how is that an improvement?”

“You can change the set of instructions! You don't rewire it like ENIAC each time you do a different calculation. You give it a new set of punch cards and use the same wiring. That is the genius of it if I may be so humble. And then it executes the new set of instructions one by one. It does exactly what you tell it to do on the punch cards and it cannot make a mistake.”

“John, you are a mathematician, the best we have and here you are building this monstrosity. It may be fast but is utterly stupid. It does exactly what you tell it to do and only

what you tell it to do. It has no imagination. Why, John, why? And please do not tell me, so we can build that goddamn H bomb.”

“And you are a physicist, the best we have, and you built yourself an A-bomb. Nobody asked you why. Why do you ask me?”

“I ask myself why I did it every day of my life. Take that as a warning, Johnny, a friendly warning.”

“I do not understand your scruples, Oppie. The A-bomb was a necessity.”

“Tell me the truth. Which fascinates you more, the computing machine or the H bomb?”

“I do not care to answer that question, Oppenheimer. Nor do I think you have any right to ask it.”

“This is a research institute for scientists and humanists. It is not a research institute for blowing the earth out of the sky.”

“I’ll tell you what I think, shall I?”

“Yes please do.”

“I think we should build the bomb before they do and annihilate them with it, destroy them without mercy before they do it to us because that is what they mean to do.”

Von Neumann and Teller, they were a pair. They would build the bomb for them but they would never use it. There was a tremendous irony there. They were building a bomb so powerful it could never be used and they just didn’t see it. Von Neumann was a great

mathematician and Teller was a great physicist, but they had completely missed the point of this weapon.

“And we will put an end to war, Oppie. We will rule in peace.”

No. There would always be another war. There would always be a bigger bomb. Until they brought the temple down in a blind fury with the strength of their backs and destroyed all the gods and all their priests and every last Philistine in one mighty blow.

“I don’t know what more to say to you, John. Build your machine. But it will be the last one that you will build here. I will see to that. I think you bring shame and dishonor on us all.”

Von Neumann ran after him as he stalked out and followed him up the steep stone stairs to daylight. He needed a smoke and a long walk.

“You know who I am thinking of, Oppie? I am thinking of Heisenberg, who knew how to build the bomb but he dragged his feet because he didn’t want Germany to have it, or he thought perhaps it can be done but he refused to apply himself, or maybe he was really not smart enough to see how to build it. And you are the new Heisenberg, aren’t you? I am ashamed of *you*. *You* bring dishonor on us all. You don’t trust your own country with its own weapon.”

No he didn’t trust his country. He didn’t trust anyone anymore. And he certainly didn’t trust himself.

A Gift

He wasn't expecting him. He wasn't expecting anyone. He was hoping his birthday might pass quietly without all the hoopla and the *chazerai*. But there he was climbing out of the blue Cadillac and wrestling a big box out of the backseat, and beautifully dressed on a Sunday afternoon in a blue blazer and charcoal slacks. He made him feel like a pauper in the poor house. He had not ventured out onto the porch on Mercer Street all afternoon for fear that one of those persistent newspaper hounds was lurking about waiting for a chance to pester him. But here he was, so he opened the front door and came out onto the porch to welcome him."

"Robert, *mein gott*, what have you got there?"

"Well, Mr. Einstein, I have come from the hardware store where I was just looking around for no particular reason when I stumbled upon this." He climbed the stairs and set the box on the round wrought iron table where Einstein took his tea.

"The hardware store? You have brought me a drill for my thick skull?"

Oppenheimer took a penknife from his pants pocket and opened the box.

"It is a radio, Herr Professor. A beautiful new radio for you."

Einstein didn't know what to think. "I have a perfectly good radio, *Herr Direktor*. It is my constant companion. Why would you buy me a radio when I already have a radio?"

"Herr Professor, allow me to bring into the living room and I will show you precisely why."

"Oh very well, Oppenheimer." He was a bit exasperated by the extravagance and the attention. He led him into the house and into the living room where Oppenheimer unboxed the

small but handsome radio and plugged it into the electrical socket in place of his RCA Victor, a beautiful freestanding piece of furniture that sat against the wall next to his red leather armchair. The wellworn chair looked like it might have been lifted from one of the undergraduate eating clubs on Prospect Street where young men read the New York Times cover to cover before dinner and discussed its contents with disapproval. But it was in fact a gift from Abraham Flexner who brought him to Princeton in '33, a scholarly coup that brought instant respect and prestige to the Institute For Advanced Studies

“Robert, what are you doing? This radio has been with me since I moved to Princeton. It is my old friend. Its taste in classical music is exactly like mine.”

“Yes I know, Albert. You listen to recorded music from the local radio stations and you listen to live concerts that are broadcast over the radio, do you not?”

“Yes I do. Of course I do. When I can find one. Which is not very often, I am afraid. Now what are you doing? You walk in and unplug my radio without a thought and plug in this little bit of a radio without so much as a please and thank you?”

“Well I happen to know there is a concert this very afternoon from Carnegie Hall where the NBC Symphony orchestra will be conducted by Toscanini. And you and I are going to sit here and listen to it on this new radio I have brought you. What do you think of that?”

“I think you are out of your mind. Carnegie Hall is fifty miles from here. You would need an antenna on the roof... an antenna the size of....Robert! *Mein Gott!!*”

Einstein ran out of the house, down the front steps and out onto the lawn and looked up at the roof of his house.

“Is that what they have been doing on my roof all week? I thought they were fixing the chimney, the louts!”

“Because that is what I told them to tell you, Herr Professor. I wanted it to be a surprise.”

He came back inside unable to hide his delight and surprise as Oppenheimer connected the leads from the antenna to the back of the new radio and turned it on. The radio glowed and hummed as the vacuum tubes slowly warmed.”

“You don’t even like me, Robert. I can only imagine the kind of presents you give to the people you like.”

“What the hell are you saying I don’t like you. I adore you. I worship you, Herr Professor.”

“Please please, I am so sick of adoration and worship I could spit. I am like that miserable German Nietzsche who sat immobile in his upstairs armchair for ten years while all of Europe came to worship his diseased brain.”

“You are no such thing, Albert. You are the heart and soul of modern physics.”

He accepted the compliment gracefully. What else could he do? So many years and so many compliments and all he could do was smile and nod. Nothing else seemed to work. He examined the radio carefully. “Can such a small thing really be so powerful?”

“Oh yes it can. The vacuum tubes get smaller and smaller and stronger and stronger.”

Oppenheimer tuned the radio to NBC in New York City and the NBC Symphony Orchestra brought to you by Nabisco played the Brahms Violin Concerto in D Major, my god what a magnificent piece of music. Forty-five minutes of deep meditative peace, nothing but music, well not nothing, how could one not think, while listening to the first movement, of the magic and the immortality of youth, one could not, but let it go, old man, it does you no good, just listen to the violin, it knows a good deal more than you do, doesn't it? It seems to know everything and it reminds you that once you knew everything too, and then you grew up and found the wisdom of your ignorance, the limitations of your soul, oh well. Better to have been young once than to be young forever. That would be intolerable and likely fatal. So many gorgeous passages. It is rather like recalling your own life it is so sweet and so familiar. Eventually his mind did go quiet and he merely listened, although merely did not really capture the experience of that listening.

When the concert was over, he got up and turned off the radio.

“Thank you, Robert Oppenheimer, a most beautiful birthday present. You have a knack, don't you? I am very grateful and very impressed.”

“You are welcome, Herr Professor. It pleases me no end that you like it.”

He took a deep breath and launched in. “You know I did not want you for this job. I lobbied against you.”

“You did more than that.”

“Yes I did. I wanted Pauli. He is a real physicist, I said. What is Oppenheimer compared to that? Well, I’ll tell you what you are now I have come to know you.”

“What am I?”

“You are a serious young man who is no longer a young man and that is not an easy thing to be. I know why you’re really here. You want me to raise my voice and make them listen in Washington. But I must tell you my friend they will not listen to me. They have never listened to me. They merely pat me on the head and say there there be a good physicist and do your homework, there’s a good boy. And that enrages me and I am too old for that kind of rage. I must have peace. I think I have earned the right to ask for that.”

He had already said too much but he felt the need to go on. How often did he have the opportunity to speak and be understood by a like-minded man?

“I know I have disappointed a great many people.”

“No you haven’t disappointed anyone. You are a worthy and admirable opponent.”

“No no, I know what you all think. That old fool Einstein, he spends his time looking for inconsistencies in quantum theory. He is tilting at windmills. What is the matter with the man?”

“But you enjoy it so much. And I think I know why, Herr Professor, if I may venture an opinion.”

He wasn’t going to stop the man. Let him speak. Maybe he had something to say.

“You devise brilliant thought experiments that no one else could possibly devise. You test the limits of quantum theory in ways that are ingenious and entertaining.”

“But it seems I am always wrong or at least I am not yet right. Why do I persist?”

“Here is my thought. When I was a boy I read about your famous thought experiment that led you to the theory of special relativity.”

“Which one?”

“The one where you imagined what it would be like to watch a light beam reflecting up and down in a mirror on a passing train and how the beam would appear to be traveling straight up and down to a person on the train but diagonally to the person watching the train pass by. So if the man of the train measures the distance light travels as two feet while the train travels one foot, then the man watching the train pass would measure the distance light travels as three feet. So time must be running more slowly for the man on the train than for the man watching the train pass.

He nodded and smiled. Ok Robert. Close enough. I won't argue the details.

“It was the most beautiful thing how it triggered in my mind that fantastic moment of comprehension, that moment of eureka when I grasped the point through the picture you painted. That is your special gift, Herr Professor, this ability to invent these beautiful thought experiments. Why would you not want to practice your art and keep on practicing it, doing your ingenious thought experiments like you did as a young man when you changed the world?”

“Yes I see what you mean, Robert. And I think it's true. I continue to practice because I still have room for improvement.” Which made them both laugh, thank god, he needed a good laugh in the midst of this dangerous discussion.

“Robert, when I came to Princeton. I was past my prime and I asked myself how will I live through all the years to come without that spark of genius I once had. How will I do it and not give in to despair? I honestly did not know. I only knew I would continue to hope for inspiration. And now I am even past being “past my prime” and I have done it. I have survived and I have even been happy. Bless my soul I don’t know how I did it but I did it. It is a great accomplishment to live beyond your own genius. It is a lesson in humility, one I hope I can pass along to you my good friend.”

“Professor, are you saying I am over the hill? I’d like to think I’m still young and I’d like to think I have a few accomplishments still to come.”

“This radio of mine, you know I listen to more than the symphony. I listen to the baseball game.”

“You do not.”

“I do! It is very relaxing.”

“Well I’ll be damned.”

“You know what happens to the home run hitters when they can’t see the pitch anymore?”

“No, Professor, I don’t.”

“They just keep swinging for the fences, and every once in a while they connect. And oh how the crowd goes wild. It is pandemonium.”

“Professor, is this some kind of parable you are imparting to me?”

“Yes it is, ^.”

“And what is the meaning of this parable?”

“Keep swinging for the fences even if you can’t really see the pitch anymore.”

Professor, he wanted to say, I suspect I have squandered my talents. Everyone seems to think it. I was onto something with my investigations of stellar collapse, but the war came along and I got all caught up in this world of power and prestige. And now as you say, I can’t see the pitch anymore.

When Shall We Three Meet Again

I am a smug bastard I will grant you that but when I walk into Hoover’s office I know from the look on his face, that dead behind the eyes look, that predator judging his prey look, the gray pasty skin, the unmoving, unreadable face that I am in the presence of a practiced killer. I’m not entirely sure he’s alive, the way you can’t tell if a lizard is alive until it flicks its tongue to taste the breeze or blinks its glassy eye in the heat.

“Come in, Mr. Teller,” he says in a manner that almost sounds like an ordinary businesslike greeting, but there’s something I hear in that greeting that makes me want to run for my life. “What can we do for you, sir?” He does not look up. He is reading a dossier on his desk, mine do doubt, or rather mine, I hope. I have nothing to hide and everything to be proud of.

“Mr. Hoover, you invited me here. I did not come here to ask you for anything.”

“Nevertheless, Mr. Teller, I would like to know what we can do for you, how we here at the Federal Bureau of Investigation can be of assistance to you in your personal efforts to combat the communist onslaught against America.”

“Ah I see.”

“The enemies of America are relentless and unforgiving, Mr. Teller. They are a slow insidious poison. And so I ask you, what can we do for you? What can *I, Edgar Hoover* do for you, sir?”

The air in the room is thick, almost viscous. I am not breathing it in and out. It seeps slowly into me and seeps slowly out. God only knows what it is looking for and what it may find within me.

“You are a patriot, Mr. Teller, in spite of your foreign origins. I say that without hesitation.”

I realize he hasn't moved, not a muscle has flexed or contracted. Finally he closes the dossier and looks up. I meet his surveillance gaze but he is impenetrable. How does he do that? I cannot read him. He is a blank. That is a skill I would like to learn. The phone rings. He picks it up and says, “I can't talk to you now. I am in a very important meeting.” I like it that I cannot tell whether he is trying to intimidate me or reassure me. I like knowing there is such a man in our government, a stealthy implacable champion of our political safety, I was going to

say freedom but we are not free, no one is free in this world, we are only safe or unsafe in the nuclear age.

“Mr. Teller. There was a traitor in our midst.”

“A traitor?” I reply. I feel the electric shock of his words in my spine.

“At Los Alamos. A traitor who has done irreparable damage to this country, a man with access to all the secrets of the atom bomb, a communist sympathizer, a foreigner. Shall I tell you his name? He is someone you know well, Mr. Teller. Someone you worked with on a daily basis in Los Alamos, someone who knows your every scientific thought.”

I am shaking. I hope he cannot see it. A sense of dread comes over me and sickens me. I reach for the chair.

“You may sit. Please do. And then I will tell you his name.”

It is as if he is going to denounce me to myself and I did not know I was a spy. How have I concealed this terrible fact from myself? How did I not know the traitor was me? I am shocked by my own naivete. I resist the urge to sink to my knees.

“Klaus Fuchs,” he says and I gasp. It’s like a blow to the chest. My entire body feels the hit. Fuchs was my student, my best, my protégé. I have been betrayed. I have been played for a fool. I am complicit. This is the end of my career.

“No.” I whisper it. “It cannot be Fuchs. I cannot believe it.” But of course I can. I can believe it of anyone. Who is not capable of the foulest, most treasonous betrayal? Aside from myself.

“There may be one or two others.”

“Fuchs knows everything!”

“Everything?”

“Everything about the uranium bomb. Everything about the plutonium bomb.”

“And what about the Super, Mr. Teller?”

“I have to think.” But I can’t. I cannot form a coherent thought. I cannot even see his face. Yes I can. Prissy, girlish Klaus, bland and boring Klaus, with his round spectacles and his female lips.

“I would like a summary from you of all of his work. I need not tell you there has been some suspicion of you, Mr. Teller. You brought him with you from Chicago. But I can protect you from all that. I will require your cooperation in return. I am a fair man.”

I find myself speaking quite rapidly. “Fuchs and von Neumann devised an implosion trigger for a thermonuclear bomb right after the War. I think you have to assume the Russians have that. I think you have to assume the Russians have everything. Fuchs was in the Theoretical Division at Los Alamos. He worked for Hans Bethe. Talk to Hans. Fuchs is Bethe’s boy. They are both German. I do not suspect Hans, but what do I know.” I do not mean to say that, but now I can’t unsay it. For all I know Bethe is the real traitor.

“Thank you, Mr. Teller. Before you go.”

Was I going? Apparently I was. But there is more. I suspect we are coming to the main event. Hoover seems to harden, the soft flesh of his round jowly face is embalmed into an undertaker's approximation of a human face, the bulldog chin like stone.

“Robert Oppenheimer.”

Oh this is good. Oppenheimer is on the agenda. I might have known. Fuchs is the past. Oppenheimer is the future. This is almost thrilling. I try to hide my excitement.

“What can you tell me about Oppenheimer's homosexual tendencies?”

I purse my lips as hard as I can so I do not smile. This is not funny. He thinks Oppenheimer is a homosexual? Is he out of his mind? I don't think I have ever met anyone whose tendencies are less homosexual than Robert Oppenheimer. His tendencies are dangerously and if I may say neurotically heterosexual. Heterosexuality is his primary vice. He has slept with more women than all the physicists at Los Alamos put together. I feign ignorance. Deep disappointment. I shake my head in shock.

“And he is a member of the communist party. I suspect he will defect to the Soviet Union.”

This is beyond belief. I am sitting in the office of the highest law enforcement official in America who has just revealed himself to be an ignoramus, who does not seem to know his ass from his elbow. I pretend to allow his words to sink in. “I am speechless,” I say as I orient myself to the situation. This idiot is telling me that Robert Oppenheimer, who has put all the prestige of his reputation into scuttling the H bomb program, is a Russian Spy. Robert

Oppenheimer, who has been a stumbling block to all my research, who has been a thorn in my side politically wherever I go in Washington. He is the single most important reason we have not committed to a crash program to build the H bomb the way we did the A-bomb. And this idiot thinks he's going to defect to the Soviet Union, where apparently he will use the vast knowledge he has accumulated to argue Stalin out of building an H bomb.

“How can I help?” I ask.

“We suspect he will take the secret of the H bomb to the Russians. We cannot let that happen.”

“I see,” I say gravely. I am quite sure Oppenheimer does not have the secret to the H bomb any more than I have the secret to the H bomb. Any more than Klaus Fuchs who probably took von Neumann's first blind stab at a solution to the H bomb and handed it over to Stalin. Fuchs could set the Russians back ten years if they think that his implosion device will produce a thermonuclear reaction. They could waste billions on it. I am perfectly aware that implosion is a dead-end idea but I'm not going to be the one to tell Hoover or anybody else for that matter. I am going to stick to my guns and argue for a billion-dollar crash program to produce an H bomb based on the implosion principle even though I know it can't possibly work. And somewhere along the line we will find a design that does work. You don't get a billion dollars from Congress by moaning, “I don't know how to do it.” You get a billion dollars by pretending you do. This is elementary stuff. I learned it from Ernest Lawrence.

“Can you prove he is a communist, Mr. Hoover? Everybody suspects it but nobody can prove it.”

“I don’t have to prove it. This is not a court of law. It’s more like what you do to a girl in high school if you want to ruin her reputation.”

His eyes seemed to be glowing now. Maybe it is my imagination. Too many childhood stories about the Golem of Warsaw, how it came to life from a lump of clay with the proper incantation, how it was invincible, undead, how it saved the Jewish people from their enemies with his strength. But Hoover is not the Golem. He is a fool. How will we ever get to Oppenheimer with idiots like Hoover calling the shots? Stalin had Beria. Hitler had Himmler. And we have this homosexual hating Hoover. God save us from the incompetence of the powerful bureaucrats.

He is trying to decide if he is done with me. He is not happy. He is disgruntled. He returns to his reading. He mumbles something about Oppenheimer. He glances at me and startles. He goes back to the document. His back hunches. The bones in his body seem to soften into cartilage. His skin goes greenish, almost amphibian, slick and blistered. Is it the light in here? Is it me? I think it is his breathing. It’s like he has become a toad before my very eyes, a puddle of pre-reptilian flesh. And now he must submerge himself before the oxygen up here kills him off, so I take my leave.

Maybe he will be of use.

King Hereafter

The royalty of Princeton are here. Is here? I like the collective noun. Are here. Robert has been lurking head and shoulders above the room, greeting couples, kissing wives, shaking hands with their owners, no, I mean their husbands. We have all sloshed our way into the sunken living room. FDR had a living room like this in Hyde Park. Eleanor invited us. She snuck me upstairs to his childhood bedroom. Oh my god, it was like a Princeton dorm room, just enough room for the bed and the desk. These people did not flaunt their wealth. We don't either. Yes we do but in a quiet way.

I'm on the chaise. Everyone is squeezing into chairs and sofas. Inhibitions are down where I like them to be, which is below the waist so to speak. "Let's play a game," I say. Robert shoots me a glance. What does he think I'm going to suggest, strip poker? He gets up with an empty martini glass and aims for the bar. "I love you, my darling," I kind of shout across the room. He turns. (Actually everyone turns.). He raises his glass. I raise mine. He's fine. I'm fine. We're all fine and dandy even though we're anything but.

"The name of this game is Rewrite Robert Frost. Someone quotes a line from Frost, you have to finish it a different way. I'll get you going. 'Two roads diverged in a wood and I --' Alexander Pais, you dear sweet man, your go!"

Alex stands. He knows this game. He probably has a good answer. "I took the nicely paved one! I didn't want to muck up my Sperry Topsiders!" He gets a few laughs. He deserves more but folks are just catching on."

"Izzy," I cry with delight. It's fake delight but no one can tell the difference. "Your turn." I give him the start again. "Two roads diverged in a wood and I --"

He gets up slowly. He's playing for time. "I took the one to the left and now Senator McCarthy is investigating me!" A huge roar of approval. Well done, Izzy.

"Robert, darling," I say as he returns with his martini glass brimming, "Have a go at Robert Frost."

"What's the pickup?" he says cheerfully. He's putting on a good show. So am I. We are the king and queen of Princeton tonight. We know how to play these parts.

"Two roads diverged in a wood and I –"

His face goes sly, a small smile and a glint in his eye. "I took them both. I am Schrödinger's Cat!" It doesn't quite make sense. Schrödinger's Cat was not in two places at once. He was alive and dead at the same time. Every schoolgirl knows that if she's married to the most famous physicist in the world after Einstein. But they all get that he's talking quantum entanglement and that makes them smart enough to get the joke, thank god! They come to their feet as one, as if Joe Louis had just floored Max Schmelling at Yankee Stadium as if DiMaggio had just laced one into the left field bleachers. As if Jesse Owens had just won his fourth gold medal at Munich. I mean it's good but it's not that good.

He'd been dreading the whole bloody evening. But maybe George Kennan would show up. He'd been to DC. He had been working to beat back the H bomb again. He sat on a bedroom chair in his undershorts. He was supposed to be getting dressed.

He stopped for a moment as the dream from the previous night came back to him. She had taken his hand and she had led him into a room. When he shut the door the sounds of the

party stopped. They embraced each other. They were not naked but he felt her skin against his as if they were. They lay down on a small bed. He wondered if they were going to make love. He hoped they would. She seemed so close.

“Come on, lazybones. Put on your pants and let’s get this show on the road.”

“I can’t.”

“Why not.”

“Don’t ask me that. Just leave me be.”

“Come on, Robert. Talk to me.”

“That damn bomb has nine lives.”

“Oh no. You want to talk about the bomb? I’ve got twenty-five for drinks and dinner.

Ok. Fine. Talk about it now. I’m listening.

“The generals are frothing at the bit to build a megaton bomb.”

“Darling, either they are chomping on the bit or they are frothing at the mouth. It’s one or the other.”

“Yes, right. Thank you for correcting my English.”

“Sorry.”

“No you’re not.”

“No, I’m not.”

“They don’t get the fundamental insight that there is no target big enough for a bomb that big. It doesn’t take out a military installation. It doesn’t take out a city. It takes out a country.”

“Yes, Robert. I’m very clear on that.”

“It’s not war. It’s genocide. The very thought of it is abhorrent.”

“So what can you do? Tell me your options.”

“Options. What are my options?”

“Yes, that’s what I’m asking you, darling, since we have guests arriving in the next half hour. You need to concentrate.”

“I’ll tell you what I’d like to do. I’d like to grab General Bradley by the balls...” He stopped to think. Did he really want to do that?

“Yes ok, General Bradley by the balls. And then what?”

“Let’s say General Bradley by the earlobes.”

“Ok, the earlobes.”

“And shout, “What the hell do you think you are doing, you prancing idiot? There are no winners in a war like this. Unless you want to be top dog in the next Stone Age. Wake up and smell the coffee!”

“Yes, all right. I’m not in favor of that option unless the others are worse. Keep going.”

She really had a way. She could anger him and entertain him simultaneously. That was finishing school for you.

“They have all succumbed to their deepest fears. All a senator has to say to these guys is, “If the Russians get it first...” And their balls bunch up like they jumped in the ocean at Penobscot.”

“Yes, Penobscot. The water is very cold in Penobscot. They are all exhausted by Hitler, aren’t they?”

“That’s precisely right, Kitty. They don’t have the stomach to take on Stalin. They want this magic bomb. They think it is the answer to their prayers.”

“But they voted it down, didn’t they, The Atomic Energy Commission? You won the vote, 3 to 2.”

“I worked like a dog to win that vote. I coaxed, I pleaded, I begged, I even used reason with them. I put it all down in black and white so even Truman could understand it. But Bradley is not convinced. And Lewis Strauss is not convinced. And now I hear Teller that goddamn idiot, I don’t know if he’s an idiot or a madman, and Lawrence, the two of them, they have got Bradley’s ear and they have got Lawrence’s ear and they are unraveling the agreement.”

“Who told you this?”

“Conant. He’s the only one who’s got a scruple left about Armageddon.”

“Yes I see. Bad news.”

“Very bad news. Can we please call it off?”

“Call what off?”

“This party. I can’t do it. I can’t face it.”

“Robert! They are all dressed. They are all talking to the babysitter. They are about to get in their cars. We can’t call it off.”

“I don’t want to mingle with the minor nobility tonight. I will say things I might regret.”

“I don’t give a damn, Robert. You will not make me look like a fool.”

“Why will you look like a fool?”

“They will say it’s me. They will say, Oh dear, Kitty’s been at the cooking sherry again, hasn’t she? Just can’t trust that girl in the kitchen these days.

“They’ll think a hell of a lot more than that!”

“That’s not funny not one bit.”

“I’m agreeing with you, for chrissake.”

“I won’t have it. I won’t be a laughingstock. I have made a goddamn effort all day, all week for that matter. Look at my eyes. Clear as a bell. I can see Manhattan from here. Not that I want to. I did it for you. This is just as important as the Atomic Energy Commission.”

“Oh for crying out loud.”

“It is every bit as important for your image, for keeping your friends close to you. And for me. So I can feel like a human being. So I can do something useful.”

“So you can feel important.”

“I am important!” She was going to start throwing things. “Goddamn you if you say I’m not.” There were tears in her eyes.

“Kitty, Kitty, please, ok. I’ll get dressed. Maybe George will show up. I really need to talk to him.”

‘Jesus, Robert. Why do I have to get mad to get my way around here? Look at me. You’ve ruined my makeup, you bastard.’

“Kitty, all right already. Let’s have a party! Let’s have some fun.”

“And no flirting with Betty in the garden. No letting her whisper in your ear. No holding of hands. No simpering debutante bullshit. Or I will hound her to the gates of Hell.”

He wasn’t even listening. He needed to drive a stake into the heart of the H bomb. Maybe George Kennan would have a brilliant idea.

“Are you listening to me, Robert?” He’s too much for me. I can’t keep him contained. I can’t hold him down. Women get wet when he enters the room. They sense it. He’s a movie star. He’s six feet tall a hundred and twenty pounds but it’s all in his cock when he finally lets go and gives it to me. Which isn’t very often but that’s ok I don’t think I could take his sexual fury on a steady basis anymore. And it’s not because of me. It’s because he can’t let me see inside of him. He can’t let me see what’s really going on. The way he needs me. The way he loves me. He thinks it makes him an animal, but really he’s scared to be human. “Are. You. Listening to me!” I fling a pump in his general direction.

“No I’m not. I’m thinking about Strauss. I said some things I shouldn’t have said.” He picked it up and threw it across the bedroom and out the bedroom door. “I don’t know how to keep my mouth shut with these know-it-all businessmen. They think their money makes them smart when in fact they are idiot savants.”

Lewis Strauss and he now took up the same space, were now entangled in some quantum physical way in which whatever happened to one immediately affected the other. Strauss was on the board of the Institute and he now chaired the Atomic Energy Commission. The two of them now lived in the same rooms and breathed the same oxygen, but they had arrived by different doors. He was a technical wizard, a wide-ranging scientist who had won his seat through merit and had the wisdom to advise warrior princes. Strauss had used his wealth to buy his way through the door to politics and influence. He had chosen his targets wisely, the Institute and the AEC. He sat at the crossroads of policy on nuclear weapons. He was a man of big and proudly uneducated opinions. He could not quote you chapter and verse. He barely knew the text, but he could preach to the choir like nobody’s business. He could turn plowshares into swords. He was late enough to the game that he could study war without shame or irony. He was dangerous and dangerously placed. He could do a lot of damage.

“We all want to play the game, even if we can’t all be as smart as you.”

“Are you taking his side? Jesus!”

“I am taking my side. My side, Robert. I have a side too in spite of what you may think.”

She timed it perfectly with the slamming of the bedroom door which was oak and slammed impressively, leaving him to prepare for the evening alone.

“George!” Kitty cried as the evening was passing its peak. “Robert, look who’s here. George Kennan.”

Kennan shook his hand. He carried a calfskin briefcase.

“George, please stick around. I have to talk to you.”

Alex sidled up to him and asked him, “Where’s the food, old man? I’m starving.”

“Kitty, Alex wants to know where’s the food,” he shouted from the bar.

“Food? Food?” she shouted back. It’s not a restaurant. It’s a party. Go make yourself some eggs if you’re so hungry.”

“Jesus, Oppie. I’m going into town to get a couple of hamburgers. I’ll be back.”

Finally there was nothing left but the ashtrays like kitchen hearths that had gone cold because the cook had fallen asleep, rocks glasses for the folks who liked their whiskey neat, the legion of martini glasses with dried rinds and peels, toothpicks and puckered olives and the guest or two rousing a spouse, standing with a coat that said get up and get me out of here. They crept home in their big boxy Chevrolets and Buicks, driving down the dead center of Olden Lane and onto Nassau Street for safety’s sake and thence home by instinct.

He had long since stopped drinking. He and Kennan were in the study. “Robert, come say goodbye,” she would shout and he would pop his head out the door of the study and slouch against the doorframe waving his goodbyes and goodnights and thanks so much for your

company, you crazy people, we adore you both. They had weathered all the cries of “Not *the* George Kennan. I read your piece in Foreign Affairs. I loved it, hated it, told everyone about it, missed it but I’ve heard so much about you. Mr. X! Honey it’s Mr. X who wrote the thing about containing the Soviets, those lowlife sons of bitches. Are you really Mr. X? “Not anymore,” he would say, explaining that he had quit the State Department so he was George Kennan now. “And what do you think of this fella Truman, Kennan? I don’t trust him as far as I can throw him. I don’t buy that midwestern self-confidence. Is he a match for Joe Stalin in your professional opinion?”

In the insulation of his cherry wood-paneled study with the built-in bookcases and the rolling librarian’s ladder they lit their pipes and sat back in his pair of armchairs.

“The news is not good,” Kennan said.

“I was hoping you might cheer me up.”

“Here. Take a look at this.” Kennan took a hefty typescript out of his briefcase. “I wrote a statement for Truman in which he would renounce the H bomb at least for now. I wrote it on spec. Don’t laugh.”

“I’m not laughing. I think it’s a genius idea.”

“I based it on three things. One. The H bomb has no military use. Two. We have as much security as we need with the A-bomb. And three. Building the H-bomb will not deter Stalin from building one. In fact it will force him to do the same.”

“This is everything we’ve been discussing.”

“Precisely.”

“I wanted to give the speech to Truman. I thought maybe I can make a statesman out of this flimflam man.”

“Did you?”

“I couldn’t even get him to look at the thing. I don’t have his ear. So ok. Tactical retreat. I turned it into a formal report, a detailed formal 80-page report on the issue of nuclear weapons that I could give to the guy who has the ear of the guy who has Truman’s ear.”

“Acheson?”

“Yeah, I figure if I do it right I can get up the chain of command to Acheson. I do have some credibility with these guys. They invoke the containment policy every day of their lives even if they never read it and generally misinterpret it if they did.”

Kennan put it in his hands and he sat down to read it. “Go say hi to Kitty. She’s in the kitchen making eggs. I’ll read it as fast as I can.”

“Skim it. You’ll get the general idea,” Kennan went looking for Kitty in the kitchen. He read with rising excitement. He fidgeted. He nodded. He bounced his feet rhythmically. He got up and paced. He stopped. He rocked. He was very nearly davening. He read it aloud when a passage spoke to him. He muttered, “Yes yes yes.” He shouted for George. “George! George! George you miserable bastard this is brilliant. This is a bullseye. This is a direct hit.” George was in the doorway with Kitty.

“OK if I listen?” she asked.

“Yes, Kitty, yes.” But she was only being polite. She knew he wanted her there. She carried three plates of scrambled eggs and toast. She gave one plate to Kennan and one to him.

“Thank you,” Kennan said. He watched them eat for a courteous moment.

“George. This is a beautiful piece of work. It makes me want to stand up and cheer. ‘No first use!’ That is a tremendously important and succinct phrase. We can use this.”

“The idea is to make THEM look like the dangerous ones,” Kennan said. “They are killing us by painting us as dangerous naïve pacifists. We have to make them look like warmongers. No first use. That is a principle every decent person can respect.”

“Kitty, he makes the point that Stalin is a rational man. That he’s not a madman like Hitler. He’s not a reckless maniac. He doesn’t want another war any more than we do.”

“Stalingrad was the work of a military genius.” Kennan loved to lecture. “He is a vicious tyrant but you have to give him that. All through the winter of ’43 he kept the Germans thinking they were about to take Stalingrad. A few days, a week, a couple of weeks. He drip fed troops across the Volga, just enough to keep the battle going. Not enough men to win but not too few to lose. In the meantime he was massing a million men on the other side of the river. The Germans had absolutely no idea. Then he crossed the river, surrounded them and slaughtered them. So give the guy some credit.”

“Who has seen this?”

“I got in to see Acheson. He read it. He took it to Truman. Truman said no. It didn’t last ten minutes. The man is an idiot.”

He froze. He stared at Kennan in disbelief.

“Acheson told me to my face Truman has no understanding of national security. He only thinks in terms of the politics. Not what will the Russians think. What will the American people think. That’s it. It’s over. He’s going to make a speech. He’s going to announce we want to build the H bomb. We got blitzed.”

“We got steamrolled,” he said.

“Truman wasn’t even listening. Complete waste of time on my part.”

“No, George. Not a waste of time.”

“Paul Nitze has my job now at State.” Kennan had more bad news. “He told me the Russians are bent on world conquest. He watches too much Flash Gordon. He thinks Stalin is Ming The Merciless with his death ray on the planet Mongo. This is what we are up against.”

He sat and fell back in the chair. The air went out of him.

“Forgive my French, Kitty, but these guys want to fuck the Russians so bad they are coming in their pants.”

Kitty laughed. “Very vivid, George.” She came over and sat on his lap and gave him a hug. “Bad news,” she said

“Very bad,” he replied. “This is the plague of Thebes.

“You should resign from the AEC,” she said softly.

“Maybe I will. Everything we won at Los Alamos we’ve lost in Washington.”

“Washington is a whited sepulcher,” she said.

Assassination

As I wait to make my entrance into Hoover’s office, I marshal my thoughts, which are many and run in different directions but all seem to curve back to the center of their gravity, Robert Oppenheimer and his unprincipled and suspect opposition to the H bomb. Hoover’s lacquered secretary says I can go in now. In spite of my common cause with the bristling spider at the center of the FBI’s intricately woven web, the thought crosses my mind that some people go in and never come out and please god not me, I would like to see the sun again after I bear witness to the dark.

“Mr. Teller. Edward. A pleasure to see you again. You are a good friend. What brings you to my office today?”

“Mr. Hoover --”

“Edgar, please. I do not stand on ceremony with you.”

“Edgar, yes.” Oh god, I can’t call him Edgar.

“My enemy’s enemy is always my friend, Edward.” He says it like he’s reminding me, like we are old warriors who have marauded through many campaigns with blunderbuss and arquebus across pestilent fens hiding a rebellious peasantry.

“I wonder if we are thinking of the same enemy,” I say with a hint of anticipation.

“I think we are. Robert of Oppenheimer, patron saint of the Left.”

“Yes, and of how much more,” I add deftly.

“More, you say? What more is this?” Hoover’s disgruntled charm is hard not to like and I find myself relaxing a bit.

“I ask myself every day, Mr. Hoover, Edgar, I ask myself why is he so dead set against the development of the H bomb, why does he put up such a fight, why is he so suspicious of the science, not even suspicious, obtuse, as if he is refusing to understand the physics of the bomb, which is hard but not intractable, as if he refuses to see the writing on the wall, why does he give Stalin the benefit of the doubt but he does not give Truman this same benefit? And so I have my ear to the ground, as you say, I think.”

“Yes ear to the ground, very good, the American Indians were the best hunters this world has ever seen, Edward. They could put an ear to the ground and hear the hoofbeats of the enemy cavalry and tell you how many men were coming and how far away they were. They were uncanny.”

“Yes exactly. I do not claim to be an Indian tracker, but here is the thing. I do hear things, Edgar.” I will never get used to calling him Edgar, but I must try. “Many people are saying many disturbing things about Robert Oppenheimer and how he always says, ‘Nyet.’”

“Nyet, Edward?”

“Yes it is Russian for no.”

“Yes I am very familiar with the Russian tongue. It has a guttural nasality that makes one suspect there is something missing from the frontal lobe in their people, some kind of genetic deformity, which makes their speech so barbaric. So unlike the beauty of your Hungarian.”

This chills my blood, this incisive, clear-minded hatred. It is bracing and heady at the same time.

“Tell me more about this, ‘Nyet.’”

I have softened him up. Now I go in for the kill.

“If you listen closely you can’t help hearing this idea, this apprehension, that he is under direct orders from Moscow.” I take a breath. Hoover does not move a muscle. He is so low to the ground no prey can see him now. “And I say this with deep misgivings. This is not something I personally believe about Robert Oppenheimer, nor is it something I would repeat casually without due consideration for the reputation of the great Robert Oppenheimer.”

This is red meat for the wildcat.

Here is what I should like to say to Hoover. “We can’t prove he’s wrong on the politics of the bomb, even though he is, because it is so damn complicated. But we can prove he’s a commie even though he isn’t. That’s easy.” Of course I can’t say this out loud. I can only hint and conspire implicitly. Hell, maybe I even believe it. I’m not entirely sure. But the point is it doesn’t matter. Oppenheimer must be neutralized. He would place stumbling blocks before the blind.

“What will you do, Edward, in aid of this cause?”

“I will do anything.” I blurt it out without thinking. It is only a few words, but it’s not so much what you say as how you say it that gets a man’s attention.

“Good.” He waits. I should say more but for a second I don’t know what to say. And then I do.

“Have you heard of this policy of No First Use?” He is not sure that he has. “This is the idea he champions. That we renounce first use of nuclear weapons. We say, ‘No, no, *après vous, monsieur.*’ to Joseph Stalin. We take the moral high ground even as we surrender our weapons. To my mind this is the most insidious despicable trick in his book. It sounds almost reasonable at first blush, but it is a mortal danger to America, to the Free World, to the future of democracy. And I am sure he does not understand that, Edgar. If he did he would get down on his knees and beg forgiveness from every man who helped us win the war with Hitler.”

Now we are both silent for a moment. I have said what I came to say. I have said it with the air of deep sadness and disappointment with a friend that gives it the ring of truth. I wait for orders.

“Here is what we are going to do, Edward. Robert Oppenheimer is a desperate help message scribbled on a piece of scrap paper intended for the innocent dreamers and communist sympathizers of this country. We are going to stuff him in a bottle, put a cork in it and fling him into the ocean. Maybe he will wash up on the shore of some faraway land crying ‘No first use! No first use!’ Or maybe he will sink to the bottom of the sea. Who cares?”

This man is a dark genius. I will follow him wherever he leads through the black shadows of this world. Hoover stands as if he is about to rush into the streets and rally the citizenry.

“I am going to defrock him in his own church!” He is immensely pleased with his rhetoric. “How does that sound to you, Mr. Teller?”

And if I cannot see my way, I will simply take his hand and say, “Lead on.”

Outlaw

“They are after you, Oppie. There is a bounty on your head.” You are basically a political outlaw to them.”

“I may have gone too far.” He and Izzy were walking down the path behind the Institute. He didn’t feel safe discussing these things indoors, not for his own sake (he had said everything he could think to say in every public forum available), but for Izzy’s. “But the truth is, it isn’t far enough, Izzy.”

“I heard you had a little run-in with Griggs from UCLA.”

“Yeah we had a little run-in.”

“He’s working for the Air Force now?”

“Yeah the Strategic Air Command. I have seen their so-called plan for strategic warfare. I can’t go into detail because it’s classified.”

“Fine. I don’t think I want to know.”

“No you don’t. But let me just tell you these guys make Hitler look like a puppy dog. They are genocidal maniacs. They sit around calculating how many bombs they need to blow up every city in Russia. And guess what? However many they have, it’s not enough and they need more. They never have enough.

“Yes I know. This guy Griggs.”

“I wrote a report, part of a report, on how to respond to a Soviet invasion of Europe. I told them, ‘You can’t bomb European cities with nuclear weapons.’ What is the point of obliterating Europe to save it from communism???. I told them tactical nuclear weapons. Battlefield weapons. I actually got in to see Eisenhower. I said, look at what these battlefield weapons will do to a Soviet armored division. You can vaporize their army on the battlefield. Leave the goddamn cities alone. He liked it. I could see he was impressed.”

“Well Griggs and his boss are furious.”

“Of course they’re furious. I said, cut the Air Force budget and give the money to the Army.”

“Oppie, he told me he thinks you are a subversive!”

“I probably am!”

“No you’re not!”

“Griggs is in with Teller. The whole pack of them, they think they can rule the world if they build a few H bombs. I am working with Conant and Lilienthal to get Truman to negotiate a moratorium on testing before they get the thing built. After that it’s too late. A complete test ban on the hydrogen bomb. This the point of no return.”

“You would need some kind of inspection protocol with the Russians.”

“No, Izzy. Come on. You can’t hide an H bomb test. It’s like a volcano erupting.”

“Ok, well, Griggs is after you.”

“Griggs is a minor player. He has no clout. But his boss...”

“Finletter?”

“Finletter said he wanted to talk. I tried, Izzy. I tried. I could not deal with the guy. Smartass Wall Street lawyer, what’s he doing running the Air Force? He’s padding his resume so he can run for the Senate. He kept trying to get me to lay my cards on the table. ‘Where do you stand on the H-bomb,’ he said. I mean what kind of question is that? I said, ‘How much time have you got?’ He didn’t like that I don’t think. He said, ‘Are you for it or against it?’ I said, ‘It’s not a yes or no question. It’s like asking me if I believe in God.’ He said, ‘Do you?’ I said, ‘It’s not a yes or no question!’ I may have raised my voice. I was a little bit exasperated. Then he asked me why I prefer battlefield nuclear weapons to strategic bombing. I said well because I would rather defeat the Soviet Army than kill everyone in Europe. He was incredulous. I said, ‘Do you doubt my loyalty or my intelligence?’ He said, ‘I haven’t made up my mind.’ I said, ‘Well I have made up mine and I do not doubt your loyalty.’”

“Jesus, Oppie. You can’t talk like that to the Secretary of the Air Force.”

“I don’t know what’s wrong with me. I feel such contempt for these idiots.”

“That’s not the point.”

“No, I know. I lack self-control. It is a fault. I am well aware of that.”

“It doesn’t help to have enemies in high places, Oppie.”

“I tell myself they can’t touch me, but they keep hounding me. I get called in by the FBI every time I turn around. They are coming out of the woodwork to accuse me of something, anything. And the words they use. I am ‘communistically oriented.’ I have ‘communitistic tendencies.’ What the hell are communitistic tendencies? It is clearly a gloss on *homosexual* tendencies. Like it’s some kind of perversion, something dirty and shameful, something forbidden in the bible and punishable by stoning. It is insidious.”

He had begun to hear it in the breeze, the voices of secret men who stirred a cauldron of poison, their incantations and mutterings, Lewis Strauss’s voice, Borden’s voice, Edgar Hoover’s voice. Like the three weird sisters, they had a spell they wished to cast, a thane they wished to dishonor and bring low. They looked under every rock for bugs and reptiles and other barely living things to throw into the seething oily water. Klaus Fuchs had spied for the Russians right under his nose; his wife had married a communist who died in Spain; he had been approached by communists; he had partied with communists; he had slept with communists; he had admired communists; he has aligned himself with communism. His wisdom was suspect, his leadership

self-serving, his celebrity dangerous, his reputation overblown. He was not a man of peace. He was a threat.

He looked up. Rabi was staring at him lost in thought. It startled him to see the concentrated look of concern on Rabi's face. Like he was watching someone dying, with an empathy that can only go so far, that hits a wall and will not allow the observer to fully understand the other man's suffering. Rabi caught himself and tried to smile. "They are gunning for you. You mark my words."

"I think my reputation makes me immune. Is that a painfully arrogant thing to say?"

"Yes it is!" Rabi's face lit up with laughter.

They had reached the river and the wooden bridge suspended over it. They climbed the concrete steps and stood on the slightly swaying planks.

"This is very nice. I never knew this was here. Why did you never tell me?" Rabi asked.

"I show this place to no one, Izzy. This is for me."

"It's overgrown and dense and silent."

"So you can see why I come here?" he asked.

"Yes."

"I can clear my head down here."

"Yes."

"It's like my synagogue except there's no rabbi."

“I thought I was your rabbi, Oppie?!”

“Oh you are, Izzy. You are. You taught me how to think like a Talmudist. You taught me it’s the questions that count, not the answers.”

“That’s right, my friend.”

“There are so many good questions in this life, but there are no good answers.”

Mike

It is the most monstrously beautiful thing I have ever seen. It is called Mike. Not that I see it directly. I have imagined it in my dreams. Some would say nightmares, but some people are so afraid of their dreams they call them nightmares when in fact they are everything they want in life but cannot admit that, yes, this is what I want, this power, this strength, this violent, victorious blow. I see the footage. It was filmed from the sky and the sea.

The first image is of an exploding dome of white heat. In slow motion, the dome glows and bubbles and roils as if the aurora borealis had erupted out of the Enewetak Atoll. It is a ball of immense fire three miles in diameter, three times the size of the final scene of destruction of Hiroshima but this is only the first hundredth of a second. The blast of the vaporized island rises on a thin column of radioactive ash that seems to be thrusting itself up like an immense atomic piston. As it rises it sends out distinct discs of ash, like multiple rings of Saturn that coalesce into a vast cloud of radioactive ash. It climbs twenty-five miles into the sky and spreads one

hundred miles wide across the South Pacific. The rounded top of the mushroom cloud is furrowed like a human brain and illuminated by enormous jagged lightning flashes, a deadly atomic mind hypothesizing the end of the world.

I watch it again and again. I learn it. I memorize it. It is almost beyond belief, the sheer majesty of the mushroom cloud, the brilliant lightning. It is godlike, overpowering. And it is mine. I made it. I imagined it. I devised it. I showed them what to do and how to do it. And I made them see why it had to be done. In spite of Oppenheimer and his talk of peace and disarmament, his talk of appeasement and brotherly love, weakness, confusion, equivocation. I have swept them all before me and I have made my mark on mankind. Ten megatons! Ten million tons of destruction. A million times more than Hiroshima or Nagasaki. Now there can be no surrender. The die is cast. The battle is joined. The H bomb is unleashed to wreak havoc on our mortal enemies. There is no going back.

The H bomb had assembled itself out of human fear. Fear of communism irradiated the unstable elements of Washington politics and compressed them into a sun-hot mass. And so we terrorize ourselves.

A sense of foreboding hung over his head. A reckoning was coming and he could either sit and wait for it or he could go out and provoke it. This waiting was intolerable. It was making him emotionally unstable. He thought, I will provoke it. He would not censor himself. He would not reign himself in. He would not suggest and hint. He would demand and require. He would not curry favor and pay lip service only to assuage his conscience. He would pound a fist

on the table and dare them to silence him. Maybe they could. Maybe they couldn't. He was going to find out. But he knew they probably could.

The Spider And The Fly

Strauss was smiling a bland unreadable smile as he entered the man's office in DC. This was not the charming institutional office where Strauss did business at the Institute For Advanced Studies. That was a coffee table office with comfortable chairs and carefully chosen classics bound in leather, a copy of Newton's *Principia*, Darwin's *Descent Of Man*, Einstein's *Relativity*, all designed to put his company at ease, on an equal footing, an effort at collegiality, as if to say, "No I haven't read the either, but we both know how important they are." This was a muscled-up lawyer's office designed to intimidate. The desk was too big, too heavy, too clean. It felt more like an altar than a desk. What did one offer to the high priest here, an ox, a pig? Everything in the room was intended to affirm Strauss's authority as chairman of the Atomic Energy Commission, the plaques, the photographs, the long walk from the double doors on a padded carpet, the flags, the stainless steel model of the tritium atom. Perhaps there was a holy of holies behind a false wall, protected by a pair of cherubim with fiery swords, or was that the Gates of Eden where angels denied any man entry.

“General Eisenhower has requested that your security clearance be reviewed. You are suspected...”. And here Strauss paused for effect or possibly to reach for the bill of charges on his all but empty desk. Oppenheimer could not help himself.

“Yes, I know very well I am suspected. Suspicion is my middle name. But please tell me what I am suspected of.”

Strauss lifted a document off his desk. It was a three-page letter. He held his hand out. “I would like to read it.” When he was done he said, “There’s nothing new here. It’s the same old story, Lewis.”

“No it is not the same old story, Robert. There is one difference.”

“And what might that be?”

“Eisenhower has revoked your security clearance pending this review.”

Until that moment he had not noticed the stillness with which Strauss held himself, the shallowness of his breathing, the set of his jaw. Now he sensed danger.

“I would like to offer you a deal.”

Of course, now came the deal. There was always a deal to be made for a good lawyer. Among the atomic events of his universe, there were no facts to be claimed, no hypotheses to be tested, no moral confusions to be confessed. Instead there were deals to be made.

“I am offering you the opportunity to resign your position on the Atomic Energy Commission and this security review, which I suspect will be very damaging, will never see the light of day.”

“There’s that word again. Suspect.” He said it calmly. He was in fact calm. He knew that some men go steely calm in the face of disaster and those were supposedly the soldiers you wanted in your foxhole. He never imagined he was one. But he was alone in this foxhole where he took cover from the shelling of the Chairman of the Atomic Energy Commission, the Director of the Federal Bureau of Investigation and all the sycophants who saw that their way to success and reputation was only and always through such men.

But it was not calm. It was despair, an overpowering discouragement at this turn of events, an inability to react forcefully, an urge to go missing, to walk off quietly and disappear.

“I don’t think so, Lewis. I don’t think I will give you the satisfaction. I want it on the record. I want it in public. Everything you people do with nuclear war policy is in the dark. You hide behind national security and make nuclear holocaust the centerpiece of your strategy without telling the American people. Which is devious and irresponsible. God only knows what would happen politically if word gets out that the indiscriminate destructive power of the hydrogen bomb is our weapon of choice. How will that square with the claim that we hold the moral high ground against the barbarians?”

Strauss’s face seemed to go dead. His eyes ceased to see, like one of those Modigliani portraits where the eyes are x’ed out. Modigliani said it represented the artist looking inward at this soul. In this case it was the killer studying his own anger.

“I haven’t signed this letter yet. I was giving you this chance, but you make it so easy for me. How can I resist signing it and sending it to the President?”

“Fine. Let’s do this in the light of day.”

“I think you will be sorry, sir.”

“I’m already sorry. I’m long since sorry.” But not yet defeated. Not nearly. He knew men who would rally to his side. He knew a few who might not. Where would Teller stand? Surely on the side of truth and openness, the disclosure of the known facts. That’s how democracy worked, right, Edward? You let the people make their choice. Otherwise they didn’t buy into it the decision the government made and they turned against it. You could only trick them so far, right, Edward? Eventually you had to play straight with your country.

The cold December wind off the Potomac attacked him from the back. He hunched forward and resisted the urge to break into a run. In Volpe’s office he felt safer. He could never feel entirely safe in Washington. Joe Volpe would give him good counsel and represent him faithfully in this kangaroo court they were assembling. But this was more than a session in strategy and tactics.

“Joe, am I kidding myself? Maybe I don’t fight this fight.”

“Wouldn’t that be seen as an admission of guilt?” Joe was not a soft man but he had a way of looking you in the eye that said, ‘Level with me and I will level with you.’”

As the warmth of the office relaxed him, he felt himself letting his guard down.

“I push and I push and I tell myself you have to keep going, stay on your feet because once I sit down I may never get up.”

“Ok, Robert, but you have to take care of yourself. You’re running on empty. Go home and talk it all over with Kitty but I know she will say you did the right thing.”

“Most of this stuff in this letter is nonsense. If it isn’t a lie, it’s a half-truth. Even the things that are true don’t amount to a hill of beans to a reasonable person.”

“What does that mean, a reasonable person, I mean here in Washington with McCarthy and Nixon sucking up all the air?”

“I’m not sure I know anymore.”

As he pulled into the driveway on Olden Lane he felt his mind shift from everything else in the world to Kitty and then to the dream in which after so many dreams for so many years he had at last made love to Jean again. He remembered it in great detail, how she had run her hand through his hair, how he had kissed her neck, the fierce determination on her face as she climbed on top, the way the bed rocked like a boat on the water, the peace he felt, the peace he saw on her face. When he woke up he had felt the most tremendous sense of loss, not because it was only a dream but because it had taken so long to dream it.

He sat in the car for several long minutes thinking you have to get up and go into the house. You’re not home yet. She must have heard him drive up. She was standing in the doorway with a martini in her outstretched hand, her head cocked to one side. Come in, darling, she was saying and catch up, but he could never catch up. He could maybe get her in view and keep her in sight like a runner who was saving one last burst for the finish line except there was

no finish line. There was only the race she was always running. No one could keep up with Kitty.

This was not a living room conversation. It was a kitchen conversation, less formal and open ended, with a few half-hearted snacks and a couple of ashtrays. He told her about the meetings with Strauss and Volpe. She seemed to be listening, allowing him to speak unopposed, waiting till he ran out of gas, or at least took a pause, encouraging him only.

“My enemies turn slights into treasons.”

“Yes I know. It’s all they have.”

“Every time I sneeze they cry plague. Every time I raise my voice they cry madman. Every time I say peace they cry traitor.” And every time he had sex they cried degenerate.

Finally she spoke.

“Darling, they’re going to crucify you and when they do I will be sitting at the foot of your cross. When they take you down I will carry you to your tomb and await your resurrection.”

“What is that supposed to mean?”

“It means I am here to support you”

“Does it?”

“Yes, Robert.”

“It doesn’t sound to me like you are taking this very seriously.”

“I am dead serious.”

But she was too far ahead of him now to look back and take him seriously. She was taunting him, making light of the news. He began to feel like he wasn't quite there, like a scrim was coming down between him and this theatre piece he was watching. She said something. He couldn't quite make it out. Maybe he didn't need that martini.

“I'm going upstairs to wash up.”

As he was climbing the stairs he felt his for a second as if he were floating and then he stumbled on the stairs but he didn't fall. Instead he drifted away.

Thus Conscience

Of course they asked me to testify. Who else would they ask? Who knows more about Oppenheimer than I do, the way he thinks, the way he acts, what it all means, the big picture from a scientific point of view, yes of course, but more importantly from a political point of view, from the standpoint of American military power in the atomic age. The thing is both sides have asked me to testify. This is a delicious conundrum. If I play my cards right.

First I am up in Rochester for a conference on physics, one of the big ones. We are all there including Bethe and Fermi and yes Oppenheimer shows his face as if nothing is happening, but something is happening and I am maybe the only one who knows that his security clearance has been suspended and may be kaput if Lewis Strauss has his way. So I stroll up to him during

a break. Everyone is buzz buzz buzz about some new kid with some new experimental result. I say, "I have been hearing things and I know this is not the time or the place to discuss it, but I'm very sorry to hear about this security thing you're going through and I hope it all goes well for you." Which you could say is the truth depending on what you mean by "goes well for you." In my case it means, you stop making trouble for the Strategic Air Command and the Atomic Energy Commission and maybe they will leave you alone. I catch him off guard and his face falls. I have used an intimate friendly tone and he responds in an intimate tone. He says, "Edward, you know me, we've worked very closely together, maybe we didn't always see eye to eye, but do you think there is anything I have done over the years, any single act or pattern of behavior that deserves this treatment?" I say, "No, I do not." What am I supposed to say to his face in public? How naïve of him to ask me that. His sense of hurt is palpable and I almost take pity on him. Then he asks me point blank if I would testify in his defense. I say I will talk to his lawyers and we'll see if I can be of use. But I know perfectly well where I can be of use.

And so I go and see this fellow Garrison his attorney who will defend him at these proceedings. And here I am very crafty. Here I am very cagey. I do not say Robert is this or Robert is that. But I do say that I have heard that people say Robert is this and I have heard that people say Robert is that. And I do not say that I find that his behavior or his statements to the press are troublesome but I do say that it troubles me that people are saying such negative things about his behavior and his statements to the press and I may have included a few innuendos about his private communications with the AEC and President Eisenhower. And so I damn him with faint praise and I am more or less certain that I will not be hearing from this fellow Garrison with regard to being a witness for the defense. I have sowed doubt in his mind as to what

precisely I will say and everyone knows that you never put someone on the stand if you don't know what they might say because that can torpedo your case right before your very eyes.

And Hoover calls me in for a little *tête à tête*. He's got a lot on his devious conspiratorial mind but Jesus he is easy to flatter. He shouldn't be so easy to flatter. You can turn his head.

I give him the summary of Fuchs' betrayal that I have labored over. He thanks me with a gravity that gives me a thrill. "Mr. Teller," he begins. He is no longer giving me that condescending Edward stuff. "We are continuing our investigations into Robert Oppenheimer. Your *précis* will be a great help. I am not able to fill you in on the details but let me just say thank you."

"There is no need," I tell him. I can be as phony baloney as the next guy. "As a man who has lived through two Hungarian revolutions in the early 1920's I cannot tell you how much I admire your vision and your courage in the defense of this country. I know how much is at stake here."

"Thank you, Mr. Teller. My job is to make you safe to do your job."

"Exactly. I always imagine you as one step ahead of the criminals. I imagine you have quite a bit up your sleeve. I don't need to know what it is. I am happy to imagine it."

"That's right, Mr. Teller."

"And I am well aware that there are laws and there are laws. And sometimes those laws have to be broken so that we can continue to live in this land of laws in the first place."

"Well maybe not broken, Mr. Teller. Bent a little. Twisted. Avoided. But not broken."

“Haha. Yes.”

“You sound like a man of the world, a man who knows the bigger right from the smaller wrong.”

“Yes. Exactly.”

He goes steely cold and quiet and then without saying so he manages to insinuate that he has bugged Oppenheimer’s home and office and the home and office of the attorney who is representing him in this security clearance review if I hear him correctly and I am certain I do because we are on a wavelength, we two men of patriotism and clear-eyed realism. What a truly remarkable man he is.

“Edward,” he says. But this is a different “Edward.” This is an intimate “Edward” not a condescending one. I think Edgar Hoover likes me. “I only wish that Mr. Oppenheimer who is a native American were as convincingly loyal to this country as you who are an immigrant.”

“Disloyal,” he says, “that’s a word I do not use lightly. That is a word that gets my full attention.” Oppenheimer is disloyal and he will have his head. It occurs to me that the prosecution may not need me to testify. I am oddly disappointed but at the same time I am relieved. Would I like to be the man who puts the final nail in Oppenheimer’s coffin? No of course I would not. But that doesn’t mean I wouldn’t do it if I saw that it was my duty to my country.

Road Trip

He knew his home and his office were bugged and his phones were tapped. He figured Izzy's office too was bugged. They seemed to flout the laws of decency as much as they flouted the laws of due process. They were driving down Route 33 in his Cadillac heading for the Jersey shore for no good reason other than it gave them an hour or two in the car.

“Izzy, why do so many people hate me? It's certainly not anything I did. I won their goddamn war for them, didn't I? I spared them an invasion of Japan, or so they all claim.”

“It's a fine line with you, Oppie, between love and hate. You are not an easy friend. There is nothing low-key or easygoing about you.”

That was not what he wanted to hear, but he accepted Rabi's judgment. Who else would tell him a truth like that?

“I've got a really bad feeling about all this, a sense of doom I can't shake. Nothing I write in response to the charges seems any good. I can hear the holes in my own story. I am trying to be respectful and careful but I end up sounding guilty as hell.”

“You have to fight the bastards, Oppie.”

“But when I get aggressive I sound like I'm hiding something. I can't find my voice.”

They watched miles and miles of farmland go by, vegetable farms, orchards, roadside stands, one pump gas stations with cannibalized cars on cinder blocks weathering into the fertile soil. They fell into silence for long stretches.

“Many years ago I was out at the ranch in New Mexico and I was out riding in the hills. I saw this wild horse at the top of a rise, a gorgeous big palomino. He was just standing there looking at us.”

“Us?”

“Me and my horse. He was sizing us up.”

“I dismounted and stood there and walked a few paces towards him. He walked a few paces towards me. So I stood there and waited. I was hoping he might come closer. There seemed to be something going on between us. I know that sounds crazy.”

“No no. I know how it is with you and horses.”

“Yes, because they are everything I am not, except when I am on one. And they have this obvious sexual energy if you know what I mean.”

“I suppose I do.”

“So I waited. And then the rest of the pack came over the hill where they must have been grazing and they surrounded us. Caught me by surprise. They surrounded me. Twenty or thirty horses. They came right up. I couldn’t get away. I was afraid to move. If they wanted to, they could have knocked me down. They could have trampled me. They could have crushed me. They could have torn me apart. They sniffed me. They jostled me. I stood stock still and tried not to panic. After a while the first horse turned away and went back over the rise and they all turned and followed him.”

“Yes but this is not the same thing, is it? These men, Strauss and his henchmen, they are not some godlike pack of superhuman creatures. They do not stand head and shoulders above you.”

“No but there is a whole herd of them and they have me surrounded.”

“Yes I understand. I don’t mean to make light of it. So tell me how is your defense shaping up?”

“Izzy, we sit around for hours in these skull sessions. Who do we hire to defend the case? Do we hire a trial attorney who knows the law, who knows his way around a courtroom? Or do we hire someone politically connected who by walking into the room says, Oppenheimer is an honest man. The man deserves a fair hearing and none of your Joseph McCarthy ‘I have here in my hand,’ bullshit.”

“And so who did you choose?”

“We split the difference, a fellow named Garrison, and I fear we got neither.”

“I’m sorry, Oppie. This is easy for me to say. I am not the one who is in danger. It’s easy for me to give advice I probably wouldn’t take myself.”

“No that’s not true. This is the advice I need to hear. But I have this sense of defeat I can’t shake. Keep talking, Izzy. Maybe I will find my voice.”

And then in a burst of energy he exclaimed, “And it angers me that I need a brilliant defense for such a trumped-up set of innuendoes and lies.”

“That’s the voice you need, Oppie, with that outraged sense of the injustice of the thing.”

“The truth is bent by the gravity of their lies.”

“Yes. Yes. Go home and write that down.”

“Yes, let’s go home. I feel better. This helps. Maybe there is a way out of this mess.”

But that was bravado. That was by way of thanking Rabi for his help. The only thing that really helped was driving down the two-lane blacktop, never coming to a stop, watching it all go by.

The Hearing

Five days into these fraudulent hearings and he was exhausted. What in God’s name was he doing? Dying for their sins? Committing suicide? Giving up? Conscientiously objecting to their obscene legal war? Was this a kangaroo court presided over by ingenuous stooges who couldn’t tell a trumped-up charge from a hole in the ground? Was this the thanks he deserved from a grateful nation? The fall that goeth after pride? Did he have it coming? Was he the victim of circumstances? Was he complicit in his own lynching? He had never felt so bewildered in his life. He had never experienced such lustful, sophisticated cruelty, the carefully disguised rage of powerful men unfettered by principle or virtue, who answered to no one. Einstein who had been sickened twice by his fellow Germans, who had developed a profound disgust for political authority, had told him more than once to walk away, refuse to accept their authority or their verdict. Both were illegitimate, he said. There was a fascist streak in American life, Oppenheimer. You must have the courage to see it. The other day he had said,

“You are in love with a woman who does not love you back.” “Who is that?” he had asked, not getting his drift. “America, Oppenheimer. She loves you not. She has moved on. She is looking for a new thrill. You’ve got it bad. I can see that. You don’t believe she will leave you, but she will. She will break your heart.” Maybe that’s what this was. He was hoping against hope she would not go through with it. He was on his knees so she would see how much he loved her in spite of her cruelty and fickle disregard. He could not believe she would do this to him. He had loved her deeply forsaking all others. If she would dare to do this to him, then he wanted her to do go ahead and do it and show her true face. But why did he have this awful sense that he had it coming to him, that a lifetime of sins was finally catching up with him? If they never get the crook for the crimes he did commit and then they nail him for one he didn’t do, isn’t that still justice? Or is that just literary irony? Maybe he was a character in a bestseller, entertainment for the discriminating reader.

The Pope in Rome had made Galileo take a knee and recant his proof that the sun was in the center of the world and not the earth. Galileo had challenged the authority of the Holy Mother Church to decide how the world was made, how the sun stood still in the sky at God’s command and moved at His behest. Galileo had placed reason over faith, discovered law over revealed word. He had not believed that serious men would refuse to see the simple beauty of his astronomy. But they had not. They would have broken him on the rack for heresy if he had not knelt. But he had to see it for himself. He had to make them show themselves for what they were, fearful small men who did not comprehend the world God gave them, who could understand the word on the page but could not comprehend the stars in the sky, who demanded

that the earth could not move, fixed as it was at the center of creation. And what did anyone remember of this story? *E pur si muove*. And yet it moves.

He would not walk away. He would let them do their worst. Maybe he had done his. He no longer knew the difference.

Lilienthal crashed and burned in his defense. Rabi mounted a brilliant counteroffensive. Kitty was fierce and uncompromising and she had one advantage over Robb, the facts, the truth. He tried his best to make the weaker argument defeat the stronger but she knew the story by heart and he could not catch her out. He only wished he had been as eloquent as his wife.

And then came the prosecution witnesses.

Act V

I am feeling a little funny. And I will tell you why. I am having second thoughts. Do not get me wrong. I am not Edmund Duke of Gloucester. I do not repent my sins as my life bleeds away in the final scene of the tragedy.

What you have charged me with, that have I done.

Maybe so, but unlike dying Edgar I do not blurt it out to the assembled court. I keep my counsel. Nor will I save Cordelia. No reprieve for a duplicitous queen from a repentant villain.

I pant for life. Some good I mean to do

Despite of my own nature.

No!

Oppenheimer is not a communist, I say to myself. He is not disloyal in that crude and unprovable sense. Ok he hired a few suspect commie physics majors from Berkeley to come along to Los Alamos. But they weren't the spies. That pasty face Klaus Fuchs, I would have his head on a pike, he was the spy. Ok he committed adultery. If you bagged enough broads in those days you were going to sleep with a communist. It was inevitable. Let's face it, they were the loosest of women. They were sexually free. It was part of their ideology. The problem with Oppenheimer is he is a pacifist. He doesn't believe in the H bomb. He has qualms about thermonuclear war. He doesn't want to destroy his enemies. He wants to love them. His influence must be negated. He holds too much sway over his fellow physicists. They listen to him.

He will foul their souls and they will lose the light.

And this is how I am feeling when that mad dog prosecutor Robb calls me into his office. He can see I am wavering. I want Oppenheimer removed from power, but let's do it for the right reason. He is of no use to us anymore. Fire him. Ignore him. But do not smear him. And then Robb says, "I've got a surprise for you." He plays me a tape he got from Edgar Hoover and Jesus Christ Almighty it's an interrogation of Oppenheimer from 1943 and he is lying and confused and he sounds so guilty God might strike him dead right there. And I am overwhelmed. The baldfaced temerity of this man to influence and incite me with secret testimony that Oppenheimer does not know about, secret inadmissible testimony that all the

judges and prosecution witnesses have heard. This is the most beautifully treacherous piece of villainy yet. I am awed at his deceit. It is so stunningly “illegal” and “wrong” that I think for a second, “Did we lose the War? Are we Nazis here?” Or maybe we are crypto-commies and the ends now justify the means! But no this is America and we have decided to do what must be done. Can the thermonuclear annihilation of the Soviet Union be far off? And so I am persuaded. This is my team. These are my boys. I will do my duty. I raise my hand and swear to tell the truth so help me god and I say “Yes, he is a security risk.” And I say, “No, I do not trust him with authority to make policy.” And, “Yes, I would like to see him removed from power.” I do not say *why*. I may have expressed some distaste for his sexual proclivities. Perhaps I raised an eyebrow at the money he threw around in the name of various communist front organizations. Possibly I pointed out one or two apparent inconsistencies in his testimony with a suggestion of mild outrage. But that is neither here nor there. Character assassination is not my forte. I leave that to the professionals. Furthermore I may have expressed a few misgivings over the dubious methodology of this reprehensible clown show, a couple of reservations for the Stalinist nonsense of Messrs. Strauss, Robb and Hoover. I may have quibbled with their leverage of the Red Scare. I’m not saying I did or I didn’t. But that means nothing. That is what one must do to protect one’s reputation. The bottom line is this: I have testified against him in open court (Open and shut is more like it. Ha!). I have placed my bet with the odds-on favorite. And I am well satisfied. My plot moves on apace!

Please do not think that I am making fun of these proceedings. I know they are in deadly earnest and not a subject for irreverence. It’s just that I am in a very expansive mood now that the thing is done.

Post Mortem

“Remember in the time before the bomb when we studied the stars?” Bethe had come to express his disgust with the cowardly bastards. “You studied stellar collapse, Oppie.”

“And you studied stellar explosion.”

“Well not quite. I studied the fusion that causes stars to burn. But a star is in a state of equilibrium. Gravity wants it to collapse and fusion wants it to expand and somehow it finds an equilibrium where the two can co-exist for many billions of years.”

“How do you account for that, Hans? Do you think God knew when he created all the hydrogen atoms that they would collapse into enormous spheres and that fusion and gravity would find the sweet spot where they could endure? Or was He genuinely surprised by the fruits of His handiwork?”

“You are being ironic. You do not believe in God. But yes that is what I think.”

“Which?”

I don't know but one or the other, or maybe there is some nuanced third thing. I am not a theologian. I do not walk down the street burning to know the answers to questions about God.”

“But this is a question of physics, Hans!”

“I’m not so sure it is. But what do you think? Why are there stars, Oppie?”

“Rabi says the whole universe is contained in the hydrogen atom. It’s a Talmudic principle. That it was all preordained

“By God?” Bethe asked.

Yes. God said ‘Aleph!’ and Moses heard in that sound all the words of the Torah.’ It’s the same thing. But you can be intrigued by the principle without believing in God.”

“Then how did it happen? How did the hydrogen atom get its binding energy?”

He had been looking at his papers on stellar collapse, sneaking peeks in his office when Kitty wasn’t around. He didn’t want her encouragement to get back to the hard science he loved now that they had made him a nonperson and erased his face from all photos of their atomic politburo. Nor did he want her discouragement, which is what he would have gotten had she been more than a couple of martinis into the day. He had been trying to see if he could get his head back into it. Daring himself really. What had happened to the fire in the mind, the curiosity to see around corners and peer down dark alleys looking for an idea? It was a young man’s game. He didn’t want to become an Einstein, who was indulged by everyone for his dogged determination to unify gravity with the nuclear forces. Poor old fellow. We know where he will be when he passes from this world. Right there at that desk doodling merrily away with the Greek alphabet looking for the answer.

“You know what that sounds like, Hans? That sounds like a new chapter for Kipling’s Just So Stories. How the Hydrogen Atom Got Its Binding Energy.

“*Ja*, I like this! Once upon a time the hydrogen atom had no binding energy and the world did not worry about thermonuclear war. Then one day...”

“...Then one day...” He took up the story. “...then one day Edward Teller got the hydrogen atom in a headlock and squeezed and squeezed with all his might. The hydrogen atom said, ‘Let me go! Let me go!’ Teller said, ‘No I will not let you go. I am very angry because Oppenheimer gets all the glory.’ And he squeezed and he squeezed until the hydrogen atom thought it would explode! And that is how the hydrogen atom got its binding energy and to this day no one is safe from the H bomb.”

“That’s good, Oppie but I don’t have the heart to laugh at that stupid man.”

Nor did he. He moved through a world of anger and hatred, where hostile intent tainted the air. There was ill will in every eye. He heard whispers in mouths that turned away. He saw conspiracy in every slight smile.

Something hovered just behind his back, something that knew him well, something that dared him to turn and face it but he couldn’t. He knew someday he would but when and how he did not know. Maybe it was just the rough uncaring world of men, maybe it was his conscience, maybe it was the bomb hanging in the bomb bay door at 35,000 feet, engineered within an inch of its short life to obliterate everything that got in its way.

“What will I do, Hans? I don’t know what to do. I have never felt this empty. There is nothing in me. Nothing of any consequence. I have nothing to give. What good am I?”

Bethe must have known not to answer.

“Have I even remembered to thank you for your testimony?”

“You have. Of course you have.”

“Then I thank you again.”

“You are welcome again.”

“In all their testimony, there was nothing new,” he said. Nothing that wasn’t said in ’47 when they cleared me.”

“One new thing, Oppie. One new thing. They have their H-bomb now and they want to perfect it. And you are in their way.”

“I should have been smarter. I shouldn’t have said don’t build it. I should have said don’t use it. I should have focused my efforts there.”

“You are kidding yourself, Oppie. Once they build it, they have to use it. That is the first law of the bomb. That’s what we learned at Los Alamos. The war was over, but they found a reason to use it. They will always find a reason. The bomb is its own reason.”

“Yes you’re right. I am kidding myself. “

“Thomas Aquinas said God is perfect so he must exist otherwise he would not be perfect. It is like that with the bomb. If it can be used then it must be used. Otherwise it isn’t the bomb. This is the metaphysics of the bomb, my friend.”

He was sick of himself. Sick of being right. Sick of being wrong. Maybe he was just sick of being. He knew no solution to that. What would he do now? He asked it of everyone.

Pretending to look in the mirror in the entrance hall to examine the line of the tux before he put on his overcoat, to futz with the black bow tie, he was really looking at the face he saw. In spite of the beautiful clothing he wore, he could not make sense of the face. It was graying away into silence. It had gone soft in the eyes. Its gaze no longer penetrated the minds of men with a keen awareness. It no longer penetrated his own mind to tell him what it saw there. “Kitty, who is this guy? I don’t recognize my own face.”

“Robert you know I don’t look in mirrors anymore. I suggest you do the same. It is the only solution to the problem.”

“You’re right. Thank you. But I will have to ask you to adjust my tie. So I can evade my existential angst.”

“It isn’t angst. It’s vanity. At least it is in my case, darling.”

But he did not need to see into his face to know what was going on within. It was all too clear there was nothing there but heartbreak, a heartbreak that had him at his wit's end. Why did it never leave him? Why wasn't he over the woman? Why did she still haunt him? That sting of regret fell over him every night as he waited impatiently for sleep to knock him out. Then it blew through his dreams like a wet wind. And when he awoke, he waited for it to find him again in the land of the living, which it did every day sooner or later, creeping up slowly or smacking him rudely in the face as he rounded a corner. Every once in a while, he would have a good day, unexpectedly, inexplicably. He would watch the day gracefully unfold as if he were a dreamer who knew he was dreaming and knew that knowing would wake him, but it didn't. It went on.

He was properly thankful for those days, but they were few and far between. The more he wanted them the unlikelier they were. He wanted not to want, but that was a very hard thing to do.

Rabi had come with condolences and news of the world. They sat in the garden on a chill bright October day. The maple trees glowed in the afternoon sun. “You are Moses in Midian. And you must wait. One day an angel of the Lord will come to you and say, ‘All the men who sought your life are dead. Go back to Egypt. There is work to be done.’”

“It’s a lovely story, Izzy. So many lovely stories in that book.”

“I sound wise but I have to tell you I ran into one of them at a restaurant in New York. “

“One of who?”

“One of the bastards who voted against you. I won’t say which one. I almost spit at him. If there had been a cream pie I would have smashed into his ugly face. “You coward. You ugly sanctimonious bastard. You call yourself a citizen? You are sheep. You are a toad. You are the scum of the earth, you miserable ignoramus.” I was shouting at him at the top of my lungs in this lovely French restaurant. “You think you are safe because you lick their hobnail boots? They will be coming for you before you know it and I will sit there and knit while they chop off your stupid head.” The jackass is a Jew. I think that’s what really got my goat.”

“So it must have been Zuckert.”

“I’m not naming names, Oppie.”

He smiled at the irony. Squirrels ran up and down the tree trunks oblivious to human affairs, but equally involved in their own.

“Sad times, Izzy.”

“Yes. Sad times. But it can’t go on like this forever. Can it?”

“Who the hell knows?”

“Who the hell knows,” Izzy responded like the congregation echoing the rabbi at the Sabbath service.

He picked up his glass and listened to the ice as swirled the remaining whiskey.

“God rewarded Noah for being a good man in his day. He has punished me for the same.”

“Maybe it is not punishment, Oppie.”

“What is it then?”

“Maybe it’s a reward. He has relieved you of responsibility. He leadeth you out of temptation.”

He couldn’t decide if Rabi really meant it and he wasn’t going to ask him.

“This is you, Izzy at your Talmudic best.”

“The Talmud contains everything.”

“Does that mean it contains both sides of every story?”

“It contains what you need to find in it. That much I know.”

He raised his glass to Rabi who smiled in sympathy.

When he looked back, his naivete saddened him. How could he not have seen they would have to destroy him. His influence on nuclear arms and arms control was utterly unacceptable to the vast majority of them. He never had a chance. He may have been the only one who didn't know it. Einstein knew it. Rabi must have known it. All of them must have known it. And no one could have dissuaded him. He had been too proud and pride had laid him low. In medieval England crime was rampant. Murder and assault were common enough but rarely did a criminal get caught. There were no police. There were no detectives gathering evidence. So when someone got caught, in order to dissuade the general populace, the punishment was as painful and gruesome as human ingenuity could devise. You probably wouldn't get caught, but if you did, Jesus God almighty you would bear the brunt of society's rage and anxiety. They had made an example of him so that the rest of his breed of physicists would shut up if they wanted the work.

He looked out the window of his corner office and did not care for the woods. He pictured the tiny suspension bridge over the river and chose not to muddy his shoes. When the early evening sky began to deepen he thought, "Bring on the night." They all thought the problem was that he had been cut off from the corridors of DC, from the offices where decisions were made, that he missed his influence, how the room turned to see him pass, went quiet to hear him speak. But it wasn't that kind of loss at all. It maddened him that he had been defeated, that the nuclear arms race was accelerating beyond anything he ever imagined in the days when the industrial might of America was struggling to scrape together mere grams of plutonium and

U235 in vast manufacturing plants, that Teller had won the battle to terrorize the world with thermonuclear weapons that threatened civilization. Those things were true, but there was a far more individual and personal loss that worked on him. What would he *do* now? He had nothing to *do*. What he had lost was not a hearing, a trial, an administrative proceeding, whatever you wanted to call it. What he had lost was the meaning in his life. He'd had a vocation that gave him direction and satisfaction as well as frustration and misgivings. He had made some brilliant decisions. He had made enormous costly errors. But that was the nature of the vocation, to rise and fall, to gain and lose the touch, to struggle on a daily basis to fashion something that made sense. What would he do from now until the end of his days? He had never gotten so far as to imagine an old age where life devolved into mere routine. Now it was prematurely here. He had no reason. He merely existed. How long would he have to do this? The thought was suffocating.

At times he found he had come to a complete halt at his desk. He may have appeared to be deep in thought but his rational mind was empty. He was deep in some feeling he couldn't put a name to or didn't care to put a name to. He preferred simply to feel it, to let it have him. Then he would notice it was gone. Was this giving up? Leaving off? Letting go? Stopping for a moment? Letting himself be? He was never very good at just being. In fact he was abysmal at it. But he was learning. Was he finding peace or subduing his disquiet? Two very different things. He was finding out.

The Truth Will Out

Izzy tore into his office with a copy of the New York Times in his hand and waved it in the air.

“Did you read it?”

“Yes, I read it.”

“All of it?”

“Most of it.”

“Jesus, Oppie. Aren’t you steaming mad? Aren’t you ready to kill? Don’t you want to go on over to Fuld Hall and wring Lewis Strauss’s deceitful neck? I do. I sure as hell do.”

He wasn’t steaming mad. He was disheartened. What could he do but shrug his shoulders?

“Aren’t you even a tiny bit surprised that he stacked the deck like that? That he got away with it?”

“Izzy, I can’t go back and fight that battle again. I don’t have the strength. Yes, I knew the deck was stacked.”

“Like this? Literally he prejudiced every element of the case he could get his filthy hands on? I mean the guy suborned witnesses. He fed them illegal wiretap evidence. He withheld evidence from the defense. He had them bug your lawyer’s office!! He knew what your defense would be!! He knew it before you knew it!!”

“No not like that. But look. If he did it, he did it because he knew he could get away with it. He knew everyone would look the other way. Does that surprise me? Not really. You could smell it the air, the witch hunt, the hysteria.”

“Why are you being so goddamn philosophical about this? He cheated you. He cheated the country.”

“Oh hell, Izzy. We all cheated.”

“I did not cheat, Oppie. I don’t want to hear that.”

“No, I’m sorry. Not you, Izzy. I didn’t mean that. But I mean we got away with murder. What should I expect, there would be no karma? There would be no hell to pay? We dropped that bomb on a defeated enemy just to prove a point.”

“I think you should go over there to Fuld Hall and demand his resignation and kick his fraudulent ass right out the window.”

He pictured it. He liked the picture in the abstract. Maybe if someone else were doing the kicking.

“You want me to claim the moral high ground, Izzy, but here’s the thing you don’t seem to get. There is no moral high ground.”

It was no-man’s land. That’s how he saw it. A hellscape. Ordnance coming at you from every direction. Once you got turned around you couldn’t tell friendly fire from enemy fire. You couldn’t tell a Tommie from a Hun. You were lucky if you knew who cut you down.

“You can’t be serious, Oppie. Don’t be so evenhanded. Don’t let him get away with this. This is your chance to get some satisfaction.”

“Satisfaction? You want me to slap his face and challenge him to a duel?”

“Yes. I don’t know. Something like that.”

“I don’t know that I have the right.”

“What is this Hamlet thing with you? You have become the Prince of Denmark. You stand on stage and everyone knows you are the smartest guy in the realm and you come downstage and you tell them you are agonized, you see both sides of every issue, which is very compelling stuff and they are transfixed by you, but where does it get you? I’ll tell you where it gets you. It gets you run through with a poisoned sword in Act Five.

Hamlet, yes, paralyzed and unable to act. Some professor at Harvard was fond of pointing out that to act has a double meaning, to do and to pretend. He was unable to do but also unable to pretend. Was he a tragic figure? Or a comical one? And while he was at it he recalled the famous double entendre of the existential philosophers: there is nothing to fear and there is *nothing* to fear. Which will it be old boy? Would he fear nothing or nothingness?

“Oppie, the bastard stacked the committee against you and then he rewrote their recommendation to make it look even worse for you. He pressured the board. He basically bribed them. It’s all down here in black and white.”

Black and white. When was there ever anything black and white?

He was standing in the doorway when Strauss looked up from his desk.

“It’s you or me, Strauss. One of us has got to go. And I think the one who won the war stays, and the one who smeared him goes. What do you think?”

“You didn’t win the war, Oppenheimer.”

“You’re right. The war was already won. We dropped the bomb on a bunch of superstitious peasants. And when I say a bunch, I mean roughly two hundred thousand.”

“Listen to you. If you’re not a communist spy, you should be because you stink of it.”

He tossed his copy of the New York Times on the floor. “You know I learned how to swear quite well in the Army. I can say ‘What the fuck is this fucking bullshit?’ as well as the next guy. But I’m not going to. I’m just going to ask you one simple question, Strauss. ‘What the fuck is this goddamn fucking bullshit, you fucking bastard.’”

“Get out of this office, Oppenheimer. I will call security.”

“Security? You going to call your partner in crime, J. Edgar Hoover? The OSS? The CIA? The New York Times is on to you, Strauss. You’re finished. You are through. You fraud. You con artist. You sanctimonious phony. Your chickens are coming home to roost, Mr. Holier-than-thou Lewis Strauss. I will demand that you resign from the Board of Directors of the Institute For Advanced Studies effective immediately and crawl back home to Savannah or Charleston or wherever the hell it is you’re from.

“Richmond, Virginia and you goddamn know it!”

“Fine, Richmond, Virginia. You and General Lee, another American villain of great sophistication.”

“Everything I did was justified by national security. And I would do it all again just to see look on your face when Edward Teller called your judgment into question, just to see you squirm. I don’t give a good goddamn what the New York Times has to say. The New York Times did not fight in the War. The New York Times doesn’t have the brains it was born with.”

He could have gone on. It might have ended well. Or maybe not. It was a pleasant fantasy, but that’s all. It was beneath his dignity to engage with Strauss. He didn’t have it in him to get riled up like that as much as everyone would have liked him to.

Black Hole

From the living room, he looked out at the white sand of the beach at Hawksnest in St. John. There was no fourth wall to this house. The indoors were outdoors in every respect except for the shade from the sun and the rain that ran off the roof. With a pen and notepad on his lap he was working on a speech for the New York Press Club. He had found his voice again as the loyal opposition. He didn’t have the ear of the generals in their Pentagon war rooms or the politicians in their Senate suites, but he had the ear of the public, the intelligentsia. When he spoke from the podium in New York or Chicago or San Francisco or Princeton or DC, he spoke with a quiet articulate intensity and they listened with a quiet rapt intensity. He knew when he

had them and he had them quite a lot, like an actor on stage who hears the audience go still when he starts to speak from the heart and his words have the ring of truth, the voice you long for in a life filled with half-lies and the numbing nonsense of political performance. He did not give them false hope. Nor did he did not speak of hellfire. He told them what must be done. Kitty drank and fought with the fools who lived down the beach. He drank less and fought more effectively. She still threw things when the words failed her at martini time and it was martini time quite often now. When there was no one else to fight with they fought with each other. They made up on the seventy-footer they sailed through the Virgins. On that gorgeous long sailboat they could sail away and say screw you all to the whole wide world and hello to each other, remind me why I love you so painfully hard and without remorse in spite of it all, remind me how our fierce loyalty to each other is all we have in the end.

But his lifelong smoker's cough had taken a painful turn for and the news was not good. Throat cancer like that fellow Wittgenstein, who went around Cambridge in the '30s asking why 2 and 2 always equaled 4, a latter-day Diogenes wandering through Athens with his lantern looking for an honest man, at least that's what von Neumann said Alan Turing had said. It hadn't gone well for Wittgenstein, the throat cancer that is. His philosophy was all the rage at Princeton.

The cobalt radiation seemed to work and then it didn't.

He stood on the shore at Hawksnest and thought I am a bowl of ashes floating on an infinite sea. For one moment only he saw the stupendous impossibility of life, the crushing

hunger to live in the beauty of the world and, at the same time, the holy need to put all things away.

Now he had something to do, a long last mile to cover. He had to make his way out of this world with grace and goodwill for his friends and his enemies. Here was a task worthy of his strengths and weaknesses. He looked forward to it in spite of the beauty of the sensible realm, the clockwork regularity of the quantum universe, the painterly riot of the human world, and in spite of the urge to resist his illness, the urge to get back to work, to put it all together and make sense of it all. Or maybe because of all that.

His dreams of Jean had tapered off, but when the dream came it was usually erotic. He had finally realized it hadn't been a procession of dreams in which finally she forgave him for disappointing her, for failing her, for abandoning her. It was a procession of dreams in which he had finally forgiven her for the unreasoning intensity of her life, an intensity he could never match, for his own anger at her for failing to accept him and love him flawed as he was but no more flawed than she was.

When he could finally travel no more he hunkered down on Olden Lane. It was a relief to be away from Hawksnest. It was too beautiful a place, too bright to be the place where he watched the light die, too comfortable to be the place where he felt such pain, too wild and free to be the place for the final imprisonment of his soul, too much alive with the booming surf and the daybreak commotion of the island birds to prepare for silence. He needed something more ordinary. He went to work saying his goodbyes.

“It's throat cancer, Izzy. All those years of chainsmoking.”

“Yeah but who knew.”

“Maybe I knew, maybe I didn’t know. But probably I suspected.”

“Don’t beat yourself up like that.”

“The way I see it, I have cut my own throat

“Are we talking medicine or politics?”

He laughed a spasmodic uproarious laugh. This was excellent gallows humor from the only man who could speak to him so intimately and so truthfully.

“As always, Izzy, you ask the right questions. I guess I’m talking both.”

John Wheeler knocked on the door one day when his hearing was nearly gone and his palate so compromised speaking was difficult and mostly obscure to the unpracticed listener. They sat in the garden. He was so frail he thought he might blow away like one filament in a delicate sphere of dandelion seeds, gray and gossamer thin, poised to waft away on the wind.

“Robert, I know we did not, I should say, do not see eye to eye on the use of thermonuclear weapons.”

He wanted to say, “You made a bargain with the devil when you threw in your lot with Edward Teller,” but it would have taken so much effort that he simply nodded his head.

“Here is what I came to say, Robert. I have, as I think you may know, gone back to work on general relativity.”

Yes he knew.

“And I have been studying an object I call a gravitationally completely collapsed object.”

Yes he had heard.

“I think of it as a black hole in the fabric of spacetime.”

“That. Is. Fascinating.” He managed to say. His eyes brightened.

“All my work stems from your ‘39 paper on stellar collapse. In all humility I am really onto something here and I have to say, forgive my temerity, there may be a Nobel Prize in my future. And more importantly a Nobel Prize in yours. You had the vision. You laid the groundwork. You deserve an enormous amount of credit for that.”

Tears filled his eyes. They didn’t give the Nobel Prize to dead men. This was John Wheeler showing him the kindness he no longer expected from the world at large.

“You never took it up again, did you?”

“No,” he said wiping away the errant tear. “Reminds me too much of myself.”

Wheeler didn’t get it until he smiled a rueful smile, and then he did.

As they said their goodbyes he shook Wheeler’s hand and said, “My only hope is that history will be kind to me and that my enemies do not get the last word.”

Now, he thought, at last I can do no harm.

It is so bad I can't go into the room. He is in so much pain. He can't speak. He only moans. He only keens. I can't listen to the pain. I can't watch him die like that. I can't. I would only make it worse for him. I can't begin to help him anymore. I stay here and wait. I would throw things, but who would I throw them at?

I found this in a notebook in his desk.

Natural Philosophy

By Robert Oppenheimer

Just when you have found

The symbols you've been seeking

For your rigorous computations

To calculate the sun

And you are deep in the machinery

Of your hulking skunkworks,

The day arrives when you must

Cease your rocketry.

Just when you have mined the earth

For seams of angst and solitude,

To catalyze in foul solutions of

Misfortune and weariness

And by some act of holy fortitude

Transmogrify their inner essences

Into precious metals of forgiveness,

Your fingers blistered, eyes gone weak,

Your heavy hands infirm

And fumbling in your solitary workshop,

You give your hasty signature

To the interrupted page and put

Away your book of outlawed alchemy.

Just when you've identified

The neither/nors, the ifs and only ifs,

The existential and universal operators

Of your closely reasoned life

From which to scrupulously construct

An elegant and simple proof of love

In this corrupted realm

You must put down your frail spectacles,

Your foolscap ruminations,

And leave it to the next

Natural philosopher,

The next seeker of the light that will go dark

Before his opened eyes.

He has much to learn and no time to waste.

The Last Word

Sometimes I forget where I am. It is the strangest thing. This morning I woke up feeling a bit confused and thinking I am late for the *gimnasium* and as my mind cleared I realized I am not a boy, I am here at Göttingen with Max Born studying quantum mechanics or whatever they have decided to call it today, only to recall that's not right I am a grown man and I work at the Met Lab in Chicago, no the Tech Area at Los Alamos and there's a war on, no the war is over but another one is coming soon if we don't get to work on the Super. Eventually I figured it all out. Not all of it. Some of it is still unclear to me, for instance why can't I get out of this chair? How long have I been here like this? Did I sleep here all night.? And who is this woman hovering about?

"Is that you, Mici?" I inquire. No, she says she doesn't know any Mici. How can she know me and not know Mici? I have to think about that.

She says she wants to feed me. Feed me? What is she talking about? I am not a baby. I am a grown man. I am world renowned. I am a father. No wait, I am The Father. Of something or other, what is it I am The Father of? It will come to me. Sometimes I have to be patient because things don't come as quickly as they once did. I was like lightning once. I was uncanny. They all said so. I've got too much stuff stored up there in my brain and I can't always find what I'm looking for.

Goddammit what have I done? I am like a child like a baby. Goddammit goddammit. If anybody ever tells you old age is when you find peace, you can tell them for me to go fuck themselves in Budapest. God what a mess I have made.

“Mici! Mici!” I try to keep the exasperation out of my voice but I am on the verge of an emotional meltdown and I just don’t give a good goddamn who knows it.

“Mici!!!”

Someone comes flying in the room.

“You’re not Mici. Where is Mici? I want Mici. I don’t want you. I don’t want anyone in white!” Oh my god I shout this several times at least. What is the matter with me today? As if I didn’t know.

“Mici isn’t here, sir.”

“Sir why are you calling me sir? Where is she?”

“Are you sure you want me to answer that question, sir?”

I don’t like the sound of her snide little voice.

“Why shouldn’t I?” I ask.

“Because I will give you the same answer today that I gave you yesterday and the day before and every day since I’ve been working here. Sir.” Very obnoxiously emphatic that “Sir.”

I look into her smug little face for the meaning of her words. And then I burst into tears. Oh god. There is no Mici. Not anymore. Oh my darling, my poor sweet Mici. Oh my sad sad

soul. Why can't I get this into my thick skull? I bawl like a baby. What the hell do I care. I don't know this broad dressed in white. I weep and gasp for breath. It feels good in a way and when it's over I feel better. I probably do this every day. That's just pathetic. I am so sick of all this. But I consider the alternative.

I ask her to clean me up as politely as I can. Which is not particularly polite. As I lift my ass out of the chair I get an electric shock up my spine and down my left leg.

"Oh Jesus God," I shout. Now I am so roaring mad I could wring her neck in her starched collar if I had the strength.

"No go away. Leave me alone." I wave my arms spastically. I would rather sit in this filth than get that thing in my back again. That is like some kind of oriental torture.

She says she wants to feed me. Feed me? What is she talking about? I am not a baby. I am a grown man. I am world-renowned. I am a father. No wait, I am The Father. Of something or other, what is it I am The Father of? It will come to me. If I am patient it will come to me.

"I was like lightning once. I was uncanny. They all said so."

"Who said what, sir?"

"Oh leave me alone." I don't sound like me. I sound like mush. Me? Who am I anyway? "Quiet quiet let me think," I shout. Which feels good even though I sound like Quasimodo.

"Oh brother," I think I hear her mutter under her breath.

The TV is on. I know that guy. Concrete. Walter Concrete. Something like that. It's endless. The day is endless. The night is a bit shorter for some reason. I have dreams. They seem to go on forever but they make no sense.

On the screen there is a red flag with a hammer on it. Cronkite is saying something. I can't understand him. Maybe if everybody would pipe down.

"Hey will you all shut up so I can think."

"Oh brother." She says it again a little louder this time.

I am just a useless old man. Too old to die. Is that what they say? "He's too old to die." They come and look at me. They look me in the face like I'm not here looking back at them and they talk like I don't hear them. When I close my eyes I doze. I don't want to doze. When I doze I wake up confused. I hate that.

Kronkite! That is the name. He is saying something about the USSR. I know what that is. That is the Soviet Union. Ah Christ what have they done? I don't like this. I feel my body grow restless. I squirm and fidget. Something in my chest is strangling me from the inside.

"What about the Soviet Union?!? I can't hear what he's saying."

"Please settle down, sir."

"Tell me what he's saying about the USSR. What did they do? What are those bastards up to?"

“Soviet Union? What are you talking about, the Soviet Union? The Soviet Union is kaput. They’re gone. It’s over. Isn’t any more Soviet Union for you to get so messed up about. Sir.”

What? What did she just say? The Soviet Union is dead and gone? My god we finally did it! I knew it. I knew it was coming. This is something I have been waiting for only I think I forgot about it being so sick and everything.

“The Soviet Union is gone? Is that what you said?”

“That is exactly what I said so you can pipe down about it please.”

“Finally!” I shout. There is exaltation in my voice. There is triumph. Victory. They have finally done what had to be done. They have finally taken my good advice. They have dropped the hydrogen bomb on the Soviet Union and obliterated the Communist Party and the Red Army. This is the culmination of my life’s work. I am overwhelmed. I am weeping with joy. I have done it. I. Me. Edward Teller. *That’s* my name. Teller. Edward Teller. I am exhausted and sick and old and confused but I have finally done what I came here to do. I am the Father of the H bomb. That’s what I am. And screw them all, Oppenheimer, Rabi, Bethe, all of them. Wasn’t it that traitor Oppenheimer who said “I am become Death, destroyer of Worlds”? Arrogant overeducated commie lover, Oppenheimer. NO! It is I who am become Death. It is I who am now the Destroyer of Worlds. Let the world take note and long remember! I Edward Teller have made the world safe. I have won the Thermonuclear War.

Something black is coming towards me. But I have no fear. From the darkness of my soul I have found invincibility. Yea, though I walk through the valley of the shadow of death, I shall fear no evil. The light of a thousand suns is with me.

New York City

August 2021