# **The Red Queen’s Race**

Isaac Asimov

Here’s a puzzle for you, if you like. Is it a crime to translate a chemistry textbook into Greek?

Or let’s put it another way. If one of the country’s largest atomic power plants is completely ruined in an unauthorized experiment, is an admitted accessory to that act a criminal?

These problems only developed with time, of course. We started with the atomic power plant-drained. I really mean drained. I don’t know exactly how large the fissionable power source was-but in two Hashing microseconds, it had all fissioned.

No explosion. No undue gamma ray density. It was merely that every moving part in the entire structure was fused. The entire main building was mildly hot. The atmosphere for two miles in every direction was gently warm. Just a dead, useless building which later on took a hundred million dollars to replace.

It happened about three in the morning, and they found Elmer Tywood alone in the central source chamber. The findings of twenty-four close-packed hours can be summarized quickly.

1. Elmer Tywood-Ph.D., Sc.D., Fellow of This and Honorary That, one-time youthful participant of the original Manhattan Project, and now full Professor of Nuclear Physics-was no interloper. He had a Class-a Pass-Unlimited. But no record could be found as to his purpose in being there just then. A table on casters contained equipment which had not been made on any recorded requisition. It, too, was a single fused mass-not quite too hot to touch.

2. Elmer Tywood was dead. He lay next to the table; his face congested, nearly black. No radiation effect. No external force of any sort. The doctor said apoplexy.

3. In Elmer Tywood’s office safe were found two puzzling items: i.e. twenty foolscap sheets of apparent mathematics, and a bound folio in a foreign language which turned out to be Greek, the subject matter, on translation, turning out to be chemistry.

The secrecy which poured over the whole mess was something so terrific as to make everything that touched it, dead. It’s the only word that can describe it. Twenty-seven men and women, all told, including the Secretary of Defense, the Secretary of Science, and two or three others so top-notch that they were completely unknown to the public, entered the power plant during the period of investigation. All who had been in the plant that night, the physicist who had identified Tywood, the doctor who had examined him, were retired into virtual home arrest.

No newspaper ever got the story. No inside dopester got it. A few members of Congress got part of it.

And naturally sol Anyone or any group or any country that could suck all the available energy out of the equivalent of perhaps fifty to a hundred pounds of plutonium without exploding it, had America’s industry and America’s defense so snugly in the palm of the hand that the light and life of one hundred sixty million people could be turned off between yawns.

Was it Tywood? Or Tywood and others? Or just others, through Tywood?

And my job? I was decoy; or front man, if you like. Someone has to hang around the university and ask questions about Tywood. After all, he was missing. It could be amnesia, a hold-up, a kidnapping, a killing, a runaway, insanity, accident-I could busy myself with that for five years and collect black looks, and maybe divert attention. To be sure, it didn’t work out that way.

But don’t think I was in on the whole case at the start. I wasn’t one of the twenty-seven men I mentioned a while back, though my boss was. But I knew a little-enough to get started.

Professor John Keyser was also in Physics. I didn’t get to him right away. There was a good deal of routine to cover first in as conscientious a way as I could. Quite meaningless. Quite necessary. But I was in Keyser’s office now.

Professors’ offices are distinctive. Nobody dusts them except some tired cleaning woman who hobbles in and out at eight in the morning, and the professor never notices the dust anyway. Lots of books without much arrangement. The ones close to the desk are used a lot-lectures are copied out of them. The ones out of reach are wherever a student put them back after borrowing them. Then there are professional journals that look cheap and are darned expensive, which are waiting about and which may some day be read. And plenty of paper on the desk; some of it scribbled on.

Keyser was an elderly man-one of Tywood’s generation. His nose was big and rather red, and he smoked a pipe. He had that easygoing and non-predatory look in his eyes that goes with an academic job-either because that kind of job attracts that kind of man or because that kind of job makes that kind of man.

I said: “What kind of work is Professor Tywood doing?”

“Research physics.”

Answers like that bounce off me. Some years ago they used to get me mad. Now I just said: “We know that, professor. It’s the details I’m after.”

And he twinkled at me tolerantly: “Surely the details can’t help much unless you’re a research physicist yourself. Does it matter-under the circumstances?”

“Maybe not. But he’s gone. If anything’s happened to him in the way of’-I gestured, and deliberately clinched—”foul play, his work may have something to do with it-unless he’s rich and the motive is money.”.

Keyser chuckled dryly: “College professors are never rich. The commodity we peddle is but lightly considered, seeing how large the supply is.”

I ignored that, too, because I know my looks are against me. Actually, I finished college with a “very good” translated into Latin so that the college president could understand it, and never played in a football game in my life. But I look rather the reverse.

I said: “Then we’re left with his work to consider.”

“You mean spies? International intrigue?”

“Why not? It’s happened before! After all, he’s a nuclear physicist, isn’t he?”

“He is. But so are others. So am I.”

“Ah, but perhaps he knows something you don’t. “

There was a stiffening to the jaw. When caught off-guard, professors can act just like people. He said, stiffly: “As I recall offhand, Tywood has published papers on the effect of liquid viscosity on the wings of the Rayleigh line, on higher-orbit field equations, and on spin-orbit coupling of two nucleons, but his main work is on quadrupole moments. I am quite competent in these matters.”

“Is he working on quadrupole moments now?” I tried not to bat an eye, and I think I succeeded.

“Yes-in a way.” He almost sneered, “He may be getting to the experimental stage finally. He’s spent most of his life, it seems, working out the mathematical consequences of a special theory of his own.”

“Like this,” and I tossed a sheet of foolscap at him.

That sheet was one of those in the safe in Tywood’s office. The chances, of course, were that the bundle meant nothing, if only because it was a professor’s safe. That is, things are sometimes put in at the spur of the moment because the logical drawer was filled with unmarked exam papers. And, of course, nothing is ever taken out. We had found in that safe dusty little vials of yellowish crystals with scarcely legible labels, some mimeographed booklets dating back to World War II and marked “Restricted,” a copy of an old college yearbook, and some correspondence concerning a possible position as Director of Research for American Electric, dated ten years back, and, of course, chemistry in Greek.

The foolscap was there, too. It was rolled up like a college diploma with a rubber band about it and had no label or descriptive title. Some twenty sheets were covered with ink marks, meticulous and small

I had one sheet of that foolscap. I don’t think anyone man in the world had more than one sheet. And I’m sure that no man in the world but one knew that the loss of his particular sheet and of his particular life would be as nearly simultaneous as the government could make it.

So I tossed the sheet at Keyser, as if it were something I’d found blowing about the campus.

He stared at it and then looked at the back side, which was blank. His eyes moved down from the top to the bottom, then jumped back to the top.

“I don’t know what this is about,” he said, and the words seemed sour to his own taste.

I didn’t say anything. Just folded the paper and shoved it back into the inside jacket pocket.

Keyser added petulantly: “It’s a fallacy you laymen have that scientists can look at an equation and say,, Ah, yes-’ and go on to write a book about it. Mathematics has no existence of its own. It is merely an arbitrary code devised to describe physical observations or philosophical concepts. Every man can adapt it to his own particular needs. For instance no one can look at a symbol and be sure of what it means. So far, science has used every letter in the alphabet, large, small and italic, each symbolizing many different things. They have used bold-faced letters, Gothic-type letters, Greek letters, both capital and small, subscripts, superscripts, asterisks, even Hebrew letters. Different scientists use different symbols for the same concept and the same symbol for different concepts. So if you show a disconnected page like this to any man, without information as to the subject being investigated or the particular symbology used, he could absolutely not make sense out of it.”

I interrupted: “But you said he was working on quadrupole moments. Does that make this sensible?” and I tapped the spot on my chest where the foolscap had been slowly scorching a hole in my jacket for two days.

“I can’t tell. I saw none of the standard relationships that I’d expect to be involved. At least I recognized none. But I obviously can’t commit myself.”

There was a short silence, then he said: “I’ll tell you. Why don’t you check with his students?”

I lifted my eyebrows: “You mean in his classes?”

He seemed annoyed: “No, for Heaven’s sake. His research students! His doctoral candidates! They’ve been working with him. They’ll know the details of that work better than I, or anyone in the faculty, could possibly know it.”

“It’s an idea,” I said, casually. It was, too. I don’t know why, but I wouldn’t have thought of it myself. I guess it’s because it’s only natural to think that any professor knows more than any student.

Keyser latched onto a lapel as I rose to leave. “ And, besides,” he said, “I think you’re on the wrong track. This is in confidence, you understand, and I wouldn’t say it except for the unusual circumstances, but Tywood is not thought of too highly in the profession. Oh, he’s an adequate teacher, I’ll admit, but his research papers have never commanded respect. There has always been a tendency towards vague theorizing, unsupported by experimental evidence. That paper of yours is probably more of it. No one could possibly want to...er, kidnap him because of it.”

“Is that so? I see. Any ideas, yourself, as to why he’s gone, or where he’s gone?”

“Nothing concrete,” he said pursing his lips, “but everyone knows he is a sick man. He had a stroke two years ago that kept him out of classes for a semester. He never did get well. His left side was paralyzed for a while and he still limps. Another stroke would kill him. It could come any time.”

“You think he’s dead, then?”

“It’s not impossible.”

“But where’s the body, then?”

“Well, really-That is your job, I think.“

It was, and I left.

I interviewed each one of Tywood’s four research students in a volume of chaos called a research laboratory. These student research laboratories usually have two hopefuls working therein, said two constituting a floating population, since every year or so they are alternately replaced.

Consequently, the laboratory has its equipment stack in tiers. On the laboratory benches is the equipment immediately being used, and in three or four of the handiest drawers are replacements or supplements which are likely to be used. In the farther drawers, in the shelves reaching up to the ceiling, in odd corners, are fading remnants of the past student generations-oddments never used and never discarded. It is claimed, in fact, that no research student ever knew all the contents of his laboratory.

All four of Tywood’s students were worried. But three were worried mainly by their own status. That is, by the possible effect the absence of Tywood might have on the status of their “problem.” I dismissed those three-who all have their degrees now, I hope-and called back the fourth.

He had the most haggard look of all, and had been least communicative-which I considered a hopeful sign.

He now sat stiffly in the straight-backed chair at the right of the desk, while I leaned back in a creaky old swivel-chair and pushed my hat off my forehead. His name was Edwin Howe and he did get his degree later on; I know that for sure, because he’s a big wheel in the Department of Science now.

I said: “You do the same work the other boys do, I suppose?”

“It’s all nuclear work, in a way.”

“But it’s not all exactly the same?”

He shook his head slowly. “We take different angles. You have to have something clear-cut, you know, or you won’t be able to publish. We’ve got to get our degrees.”

He said it exactly the way you or I might say, “We’ve got to make a living.” At that, maybe it’s the same thing for them.

I said: “All right. What’s your angle?”

He said: “I do the math. I mean, with Professor Tywood.”

“What kind of math?”

And he smiled a little, getting the same sort of atmosphere about him that I had noticed in Professor Keyser’s case that morning. A sort of, “Do-you-really-think-I-can-explain-all-my-profound-thoughts-to-stupid-little-you?” sort of atmosphere.

All he said aloud, however, was: “That would be rather complicated to explain.”

“I’ll help you,” I said. “Is that anything like it?” And I tossed the foolscap sheet at him.

He didn’t give it any once-over. He just snatched it up and let out a thin wail: “Where’d you get this?”

“From Tywood’s safe.”

“Do you have the rest of it, too?”

“It’s safe,” I hedged.

He relaxed a little-just a little: “You didn’t show it to anybody, did you?”

I showed it to Professor Keyser.”

Howe made an impolite sound with his lower lip and front teeth, “That jackass. What did he say?”

I turned the palms of my hands upward and Howe laughed. Then he said, in an offhand manner: “Well, that’s the sort of stuff I do.”

“And what’s it all about? Put it so I can understand it.”

There was distinct hesitation. He said: “Now, look. This is confidential stuff. Even Pop’s other students don’t know anything about it. I don’t even think I know all about it. This isn’t just a degree I’m after, you know. It’s Pop Tywood’s Nobel Prize, and it’s going to be an Assistant Professorship for me at Cal Tech. This has got to be published before it’s talked about.”

And I shook my head slowly and made my words very soft: “No, son. You have it twisted. You’ll have to talk about it before it’s published, because Tywood’s gone and maybe he’s dead and maybe he isn’t. And if he’s dead, maybe he’s murdered. And when the department has a suspicion of murder, everybody talks. Now, it will look bad for you, kid, if you try to keep some secrets.”

It worked. I knew it would, because everyone reads murder mysteries and knows all the clichés. He jumped out of his chair and rattled the words off as if he had a script in front of him.

“Surely,” he said, “You can’t suspect me of...of anything like that. Why...why, my career—”

I shoved him back into his chair with the beginnings of a sweat on his forehead. I went into the next line: “I don’t suspect anybody of anything yet. And you won’t be in any trouble, if you talk, chum.”

He was ready to talk. “Now this is all in strict confidence.”

Poor guy. He didn’t know the meaning of the word “strict.” He was never out of eyeshot of an operator from that moment till the government decided to bury the whole case with the one final comment of “?” Quote. Unquote. (I’m not kidding. To this day, the case is neither opened nor closed. It’s just “?”)

He said, dubiously; “You know what time travel is, I suppose?”

Sure I knew what time travel was. My oldest kid is twelve and he listens to the afternoon video programs till he swells up visibly with the junk he absorbs at the ears and eyes.

“What about time travel?” I said.

“In a sense, we can do it. Actually, it’s only what you might call micro-temporal-translation —”

I almost lost my temper. In fact, I think I did. It seemed obvious that the squirt was trying to diddle me; and without subtlety. I’m used to having people think I look dumb; but not that dumb.

I said through the back of my throat: “Are you going to tell me that Tywood is out somewhere in time-like Ace Rogers, the Lone Time Ranger?” (That was Junior’s favorite program-Ace Rogers was stopping Genghis Khan single-handed that week.)

But he looked as disgusted as I must have. “No,” he yelled. “I don’t know where Pop is. If you’d listen to me-I said micro-temporal-translation. Now, this isn’t a video show and it isn’t magic; this happens to be science. For instance, you know about matter-energy equivalence, I suppose.”

I nodded sourly. Everyone knows about that since Hiroshima in the last war but one.

“All right, then,” he went on, “that’s good for a start. Now, if you take a brown mass of matter and apply temporal translation to it-you know, send it back in time-you are, in effect, creating matter at the point in time to which you are sending it. To do that, you must use an amount of energy equivalent to the amount of matter you have created. In other words, to send a gram-or, say, an ounce-of anything back in time, you have to disintegrate an ounce of matter completely, to furnish the energy required.”

“Hm-m-m,” I said, “that’s to create the ounce of matter in the past. But aren’t you destroying an ounce of matter by removing it from the present? Doesn’t that create the equivalent amount of energy?”

And he looked just about as annoyed as a fellow sitting on a bumblebee that wasn’t quite dead. Apparently laymen are never supposed to question scientists.

He said: “I was trying to simplify it so you would understand it. Actually, it’s more complicated. It would be very nice if we could use the energy of disappearance to cause it to appear, but that would be working in a circle, believe me. The requirements of entropy would forbid it. To put it more rigorously, the energy is required to overcome temporal inertia and it just works out so that the energy in ergs required to send back a mass, in grams, is equal to that mass times the square of the speed of light in centimeters per second. Which just happens to be the Einstein Mass-Energy Equivalence Equation. I can give you the mathematics, you know.”

“I know,” I waxed some of that misplaced eagerness back. “But was all this worked out experimentally? Or is it just on paper?”

Obviously, the thing was to keep him talking.

He had that queer light in his eye that every research student gets, I am told, when he is asked to discuss his problem. Hell discuss it with anyone, even with a “dumb flatfoot”-which was convenient at the moment.

“You see,” he said like a man slipping you the inside dope on a shady business deal, “what started the whole thing was this neutrino business. They’ve been trying to find that neutrino since the late thirties and they haven’t succeeded. It’s a subatomic particle which has no charge and has a mass much less than even an electron. Naturally, it’s next to impossible to spot, and hasn’t been spotted yet. But they keep looking because, without assuming that a neutrino exists, the energetics of some nuclear reactions can’t be balanced. So Pop Tywood got the idea about twenty years ago that some energy was disappearing, in the form of matter, back into time. We got working on that-or he did-and I’m the first student he’s ever had tackle it along with him.

“Obviously, we had to work with tiny amounts of material and... well, it was just a stroke of genius on Pop’s part to think of using traces of artificial radioactive isotopes. You could work with just a few micrograms of it, you know, by following its activity with counters. The variation of activity with time should follow a very definite and simple law which has never been altered by any laboratory condition known.

“Well, we’d send a speck back fifteen minutes, say, and fifteen minutes before we did that-everything was arranged automatically, you see-the count jumped to nearly double what it should be, fell off normally, and then dropped sharply at the moment it was sent back below where it would have been normally. The material overlapped itself in time, you see, and for fifteen minutes we counted the doubled material—”

I interrupted: “You mean you had the same atoms existing in two places at the same time.”

“Yes,” he said, with mild surprise, “why not? That’s why we use so much energy-the equivalent of creating those atoms.” And then he rushed on, “Now I’ll tell you what my particular job is. If you send back the material fifteen minutes, it is apparently sent back to the same spot relative to the Earth despite the fact that in fifteen minutes, the Earth moved sixteen thousand miles around the Sun, and the Sun itself moves more thousand miles and so on. But there are certain tiny discrepancies which I’ve analyzed and which turn out to be due, possibly, to two causes.

“First, there is a frictional effect-if you can use such a term-so that matter does drift a little with respect to the Earth, depending on how far back in time it is sent, and on the nature of material. Then, too, some of the discrepancy can only be explained by the assumption that passage through time itself takes time.”

“How’s that?” I said.

“What I mean is that some of the radioactivity is evenly spread throughout the time of translation as if the material tested had been reacting during backward passage through time by a constant amount. My figures show that-well, if you were to be moved backward in time, you would age one day for every hundred years. Or, to put it another way, if you could watch a time dial which recorded the time outside a ‘time-machine,’ your watch would move forward twenty-four hours while the time dial moved back a hundred years. That’s a universal constant, I think, because the speed of light is a universal constant. Anyway, that’s my work.”

After a few minutes, in which I chewed all this, I asked: “Where did you get the energy needed for your experiments?”

“They ran out a special line from the power plant. Pop’s a big shot there, and swung the deal.”

“Hm-m-m. What was the heaviest amount of material you sent into the past?”

“Oh”-he sent his eyes upwards—”I think we shot back one hundredth of a milligram once. That’s ten micrograms.”

“Ever try sending anything into the future?”

“That won’t work,” he put in quickly. “Impossible. You can’t change signs like that, because the energy required becomes more than infinite. It’s a one-way proposition.”

I looked hard at my fingernails: “How much material could you send back in time if you fissioned about...oh, say, one hundred pounds of plutonium.” Things, I thought, were becoming, if anything, too obvious.

The answer came quickly: “In plutonium fission,” he said, “not more than one or two percent of the mass is converted into energy. Therefore, one hundred pounds of plutonium when completely used up would send a pound or two back into time.”

“Is that all? But could you handle all that energy? I mean, a hundred pounds of plutonium can make quite an explosion.”

“All relative,” he said, a bit pompously. “If you took all that energy and let it loose a little at a time, you could handle it. If you released it all at once, but used it just as fast as you released it, you could still handle it. In sending back material through time, energy can be used much faster than it can possibly be released even through fission. Theoretically, anyway...

“But how do you get rid of it?”

“It’s spread through time, naturally. Of course, the minimum time through which material could be transferred would, therefore, depend on the mass of the material. Otherwise, you’re liable to have the energy density with time too high.”

“All right, kid,” I said. “I’m calling up headquarters, and they’ll send a man here to take you home. You’ll stay there a while.”

“But—What for?”

“It won’t be for long.”

It wasn’t—and it was made up to him afterwards.

I spent the evening at Headquarters. We had a library there-a very special kind of library. The very morning after the explosion, two or three operators had drifted quietly into the chemistry and physics libraries of the University. Experts in their way. They located every article Tywood had ever published in any scientific journal and had snapped each page. Nothing was disturbed otherwise.

Other men went through magazine files and through book lists. It ended with a room at Headquarters that represented a complete Tywoodana. Nor was there a definite purpose in doing this. It merely represented part of the thoroughness with which a problem of this sort is met.

I went through that library. Not the scientific papers. I knew there’d be nothing there that I wanted. But he had written a series of articles for a magazine twenty years back, and I read those. And I grabbed at every piece of private correspondence they had available.

After that, I just sat and thought-and got scared.

I got to bed about four in the morning and had nightmares.

But I was in the Boss’ private office at nine in the morning just the same.

He’s a big man, the Boss, with iron-gray hair slicked down tight. He doesn’t smoke, but he keeps a box of cigars on his desk and when he doesn’t want to say anything for a few seconds, he picks one up, rolls it about a little, smells it, then sticks it right into the middle of his mouth and lights it in a very careful way. By that time, he either has something to say or doesn’t have to say anything at all. Then he puts the cigar down and lets it bum to death.

He used up a box in about three weeks, and every Christmas, half his gift-wraps held boxes of cigars.

He wasn’t reaching for any cigars now, though. He just folded his big fists together on the desk and looked up at me from under a creased forehead. “What’s boiling?”

I told him. Slowly, because micro-temporal-translation doesn’t sit well with anybody, especially when you call it time travel, which I did. It’s a sign of how serious things were that he only asked me once if I were crazy.

Then I was finished and we stared at each other.

He said: “And you think he tried to send something back in time-something weighing a pound or two-and blew an entire plant doing it?”

“It fits in,” I said.

I let him go for a while. He was thinking and I wanted him to keep on thinking. I wanted him, if possible, to think of the same thing I was thinking, so that I wouldn’t have to tell him

Because I hated to have to tell him—

Because it was nuts, for, one thing. And too horrible, for another.

So I kept quiet and he kept on thinking and every once in a while some of his thoughts came to the surface.

After a while, he said: “Assuming the student, Howe, to have told the truth-and you’d better check his notebooks, by the way, which I hope you’ve impounded-“

“The entire wing of that floor is out of bounds, sir. Edwards has the notebooks.”

He went on: “ All right. Assuming he told us all the truth he knows, why did Tywood jump from less than a milligram to a pound?”

His eyes came down and they were hard: “Now you’re concentrating on the time-travel angle. To you, I gather, that is the crucial point, with the energy involved as incidental-purely incidental.”

“Yes, sir,” I said grimly. “I think exactly that.”

“Have you considered that you might be wrong? That you might have matters inverted?”

“I don’t quite get that.”

“Well, look. You say you’ve read up on Tywood. All right. He was one of that bunch of scientists after World War II that fought the atom bomb; wanted a world state-you know about that, don’t you?”

I nodded.

“He had a guilt complex, “ the Boss said with energy. “He’d helped work out the bomb, and he couldn’t sleep nights thinking of what he’d done. He lived with that fear for years. And even though the bomb wasn’t used in World War III, can you imagine what every day of uncertainty must have meant to him? Can you imagine the shriveling horror in his soul as he waited for others to make the decision at every crucial moment till the final Compromise of Sixty-Five?

“We have a complete psychiatric analysis of Tywood and several others just like him, taken during the last war. Did you know that?”

“No, sir.”

“It’s true. We let up after Sixty-Five, of course, because with the establishment of world control of atomic power, the scrapping of the atomic bomb stockpile in all countries, and the establishment of research liaison among the various spheres of influence on the planet, most of the ethical conflict in the scientific mind was removed.

“But the findings at the time were serious. In 1964, Tywood had a morbid subconscious hatred for the very concept of atomic power. He began to make mistakes, serious ones. Eventually, we were forced to take him off research of any kind. And several others as well, even though things were pretty bad at the time. We had just lost India, if you remember.”

Considering that I was in India at the time, I remembered. But I still wasn’t seeing his point.

“Now, what,” he continued, “if dregs of that attitude remained buried in Tywood to the very end? Don’t you see that this time-travel is a double-edged sword? Why throw a pound of anything into the past, anyway? For the sake of proving a point? He had proved his case just as much when he sent back a fraction of a milligram. That was good enough for the Nobel Prize, I suppose.

“But there was one thing he could do with a pound of matter that he couldn’t do with a milligram, and that was to drain a power plant. So that was what he must have been after. He had discovered a way of consuming inconceivable quantities of energy. By sending back eighty pounds of dirt, he could remove all the existing plutonium in the world, End atomic power for an indefinite period.”

I was completely unimpressed, but I tried not to make that too plain. I just said: “Do you think he could possibly have thought he could get away with it more than once?”

“This is all based on the fact that he wasn’t a normal man. How do I know what he could imagine he could do? Besides, there may be men behind him-with less science and more brains-who are quite ready to continue onwards from this point.”

“Have any of these men been found yet? Any evidence of such men?”

A little wait, and his hand reached for the cigar box. He stared at the cigar and turned it end for end. Just a little wait more. I was patient.

Then he put it down decisively without lighting it. “

“No,” he said.

He looked at me, and clear through me, and said: “Then, you still don’t go for that?”

I shrugged, “Well-It doesn’t sound right.”

“Do you have a notion of your own?”

“Yes. But I can’t bring myself to talk about it. If I’m wrong, I’m the wrongest man that ever was; but if I’m right, I’m the rightest.”

“I’ll listen,” he said, and he put his hand under the desk.

That was the pay-off. The room was armored, sound-proof, and radiation-proof to anything short of a nuclear explosion. And with that little signal showing on his secretary’s desk, the President of the United States couldn’t have interrupted us.

I leaned back and said: “Chief, do you happen to remember how you met your wife? Was it a little thing?”

He must have thought it a non sequitur. What else could he have thought? But he was giving me my head now; having his own reasons, I suppose.

He just smiled and said: “I sneezed and she turned around. It was at a street comer.”

“What made you be on that street corner just then? What made her be? Do you remember just why you sneezed? Where you caught the cold? Or where the speck of dust came from? Imagine how many factors had to intersect in just the right place at just the right time for you to meet your wife.”

“I suppose we would have met some other time, if not then?”

“But you can’t know that. How do you know whom you didn’t meet, because once when you might have turned around. you didn’t; because once when you might have been late, you weren’t. Your life forks at every instant, and you go down one of the forks almost at random, and so does everyone else. Start twenty years ago, and the forks diverge further and further with time.

“You sneezed, and met a girl, and not another. As a consequence, you made certain decisions, and so did the girl, and so did the girl you didn’t meet, and the man who did meet her, and the people you all met thereafter. And your family, her family, their family-and your children.

“Because you sneezed twenty years ago, five people, or fifty, or five hundred, might be dead now who would have been alive, or might be alive who would have been dead. Move it two hundred years ago: two thousand years ago, and a sneeze-even by someone no history ever heard of-might have meant that no one now alive would have been alive...

The Boss rubbed the back of his head: “Widening ripples. I read a story once—”

“So did I. It’s not a new idea-but I want you to think about it for a while, because I want to read to you from an article by Professor Elmer Tywood in a magazine twenty years old. It was just before the last war...

I had copies of the film in my pocket and the white wall made a beautiful screen, which was what it was meant to do. The boss made a motion to turn about, but I waved him back.

“No, sir,” I said. “I want to read this to you. And I want you to listen to it.”

He leaned back.

“The article,.. I went on, is entitled: ‘Man’s First Great Failure!’ Remember, this was just before the war, when the bitter disappointment at the final failure of the United Nations was at its height. What I will read are some excerpts from the first part of the article. It goes like this:

“’…That Man, with his technical perfection, has failed to solve the great sociological problems of today is only the second immense tragedy that has come to the race. The first, and perhaps the greater, was that, once, these same great sociological problems were solved; and yet these solutions were not permanent, because the technical perfection we have today did not then exist

“‘It was a case of having bread without butter, or butter without bread. N ever both together....

“‘Consider the Hellenic world, from which our philosophy, our mathematics, our ethics, our art, our literature-our entire culture, in fact-stem...In the days of Pericles, Greece, like our own world in microcosm, was a surprisingly modem potpourri of conflicting ideologies and ways of life. But then Rome came, adopting the culture, but bestowing, and enforcing, peace. To be sure, the Pax Romana lasted only two hundred years, but no like period has existed since....

“‘War was abolished. Nationalism did not exist. The Roman citizen was Empire-wide. Paul of Tarsus and Flavius Josephus were Roman citizens. Spaniards, North Africans, Illyrians assumed the purple. Slavery existed, but it was an indiscriminate slavery, imposed as a punishment, incurred as the price of economic failure, brought on by the fortunes of war. No man was a natural slave-because of the color of his skin or the place of his birth.

“‘Religious toleration was complete. If an exception was made early in the case of the Christians, it was because they refused to accept the principle of toleration; because they insisted that only they themselves knew truth-a principle abhorrent to the civilized Roman....

“‘With all of Western culture under a single polis, with the cancer of religious and national particularism and exclusivism absent; with a high civilization in existence-why could not Man hold his gains?

“‘It was because, technologically, ancient Hellenism remained backward. It was because without a machine civilization, the price of leisure-and hence civilization and culture-for the few, was slavery for the many. Because the civilization could not find the means to bring comfort and ease to all the population.

“‘Therefore, the depressed classes turned to the other world, and to religions which spurned the material benefits of this world-so that science was made impossible in any true sense for over a millennium. And further, as the initial impetus of Hellenism waned, the Empire lacked the technological powers to beat back the barbarians. In fact, it was not till after 1500 A.D. that war became sufficiently a function of the industrial resources of a nation to enable the settled people to defeat invading tribesmen and nomads with ease....

“‘Imagine, then, if somehow the ancient Greeks had learned just a hint of modem chemistry and physics. Imagine if the growth of the Empire had been accompanied by the growth of science, technology and industry. Imagine an Empire in which machinery replaced slaves, in which all men had a decent share of the world’s goods, in which the legion became the armored column against which no barbarians could stand. Imagine an Empire which would therefore spread all over the world, without religious or national prejudices

“’ An Empire of all men-all brothers-eventually all free....

“ ‘If history could be changed. If that first great failure could have been prevented-’ “

And I stopped at that point.

“Well?” said the Boss.

“Well,” I said, “I think it isn’t difficult to connect all that with the fact that Tywood blew an entire power plant in his anxiety to send something back to the past, while in his office safe we found sections of a chemistry textbook translated into Greek.”

His face changed, while he considered.

Then he said heavily: “But nothing’s happened.”

“I know. But then I’ve been told by Tywood’s student that it takes a day to move back a century in time. Assuming that ancient Greece was the target area, we have twenty centuries, hence twenty days.”

“But can it be stopped?”

“I wouldn’t know. Tywood might, but he’s dead.”

The enormity of it all hit me at once, deeper than it had the night before—

All humanity was virtually under sentence of death. And while that was merely horrible abstraction, the fact that reduced it to a thoroughly unbearable reality was that I was, too. And my wife, and my kid.

Further, it was a death without precedence. A ceasing to exist, and no more. The passing of a breath. The vanishing of a dream. The drift into eternal non-space and non-time of a shadow. I would not be dead at all, in fact I would merely never have been born.

Or would I? Would I exist-my individuality-my ego-my soul, if you like? Another life? Other circumstances?

I thought none of that in words then. But if a cold knot in the stomach could ever speak under the circumstances, it would sound like that, I think.

The Boss moved in on my thoughts-hard.

“Then, we have about two and a half weeks. No time to lose. Come on.”

I grinned with one side of my mouth: “What do we do? Chase the book?”

“No,” he replied coldly, “but there are two courses of action we must follow. First, you may be wrong-altogether. All of this circumstantial reasoning may still represent a false lead, perhaps deliberately thrown before us, to cover up the real truth. That must be checked.

“Secondly, you may be right-but there may be some way of stopping the book: other than chasing it in a time machine, I mean. If so, we must find out how.”

“I would just like to say, sir, if this is a false lead, only a madman would consider it a believable one. So suppose I’m right, and suppose there’s no way of stopping it?”

“Then, young fellow, I’m going to keep pretty busy for two and a half weeks, and I’d advise you to do the same. The time will pass more quickly that way.”

Of course he was right.

“Where do we start?” I asked.

“The first thing we need is a list of all men and women on the government payroll under Tywood.”

“Why?”

“Reasoning. Your specialty, you know. Tywood doesn’t know Greek, I think we can assume with fair safety, so someone else must have done the translating. It isn’t likely that anyone would do a job like that for nothing, and it isn’t likely that Tywood would payout of his personal funds-not on a professor’s salary.”

“He might, “ I pointed out, “have been interested in more secrecy than a government payroll affords.”

“Why? Where was the danger? Is it a crime to translate a chemistry textbook into Greek? Who would ever deduce from that a plot such as you’ve described?”

It took us half an hour to turn up the name of Mycroft James Boulder, listed as “Consultant, “ and to find out that he was mentioned in the University Catalogue as Assistant Professor of Philosophy and to check by telephone that among his many accomplishments was a thorough knowledge of Attic Greek.

Which was a coincidence-because with the Boss reaching for his hat, the interoffice teletype clicked away and it turned out that Mycroft James Boulder was in the anteroom, at the end of a two-hour continuing insistence that he see the Boss.

The Boss put his hat back and opened his office door.

Professor Mycroft James Boulder was a gray man. His hair was gray and his eyes were gray. His suit was gray, too.

But most of all, his expression was gray; gray with a tension that seemed to twist at the lines in his thin face.

Boulder said, softly: “I’ve been trying for three days to get a hearing, sir, with a responsible man. I can get no higher than yourself.”

“I may be high enough,” said the Boss. “What’s on your mind?”

“It is quite important that I be granted an interview with Professor Tywood.”

“Do you know where he is?”

“I am quite certain that he is in government custody.”

“Why?”

“Because I know that he was planning an experiment which would entail the breaking of security regulations. Events since, as nearly as I can make them out, flow naturally from the supposition that security regulations have indeed been broken. I can presume, then, that the experiment has at least been attempted. I must discover whether it has been successfully concluded.”

“Professor Boulder,” said the Boss, “I believe you can read Greek.”

“Yes, I can,” -coolly.

“And have translated chemical texts for Professor Tywood on government money.”

“Yes-as a legally employed consultant.”

“Yet such translation, under the circumstances, constitutes a crime, since it makes you an accessory to Tywood’s crime.”

“You can establish a connection?”

“Can’t you? Or haven’t you heard of Tywood’s notions on time travel, or...what do you call it...micro-temporal-translation?”

“Ah?” and Boulder smiled a little. “He’s told you, then.”

“No, he hasn’t,” said the Boss, harshly. “Professor Tywood is dead.”

“What?” Then—”I don’t believe you.”

“He died of apoplexy. Look at this.”

He had one of the photographs taken that first night in his wall safe. Tywood’s face was distorted but recognizable-sprawled and dead.

Boulder’s breath went in and out as if the gears were clogged. He stared at the picture for three full minutes by the electric clock on the wall. “Where is this place?” he asked.

“The Atomic Power Plant. “

“Had he finished his experiment?”

The Boss shrugged: “There’s no way of telling. He was dead when we found him.”

Boulder’s lips were pinched and colorless. “That must be determined, somehow. A commission of scientists must be established, and, if necessary, the experiment must be repeated—”

But the Boss just looked at him, and reached for a cigar. I’ve never seen him take longer-and when he put it down, curled in its unused smoke, he said: “Tywood wrote an article for a magazine, twenty years ago—”

“Oh, “ and the professor’s lips twisted, “is that what gave you your clue? You may ignore that. The man is only a physical scientist and knows nothing of either history or sociology. A schoolboy’s dreams and nothing more.”

“Then, you don’t think sending your translation back will inaugurate a Golden Age, do you?”

“Of course not. Do you think you can graft the developments of two thousand years of slow labor onto a child society not ready for it? Do you think a great invention or a great scientific principle is born full-grown in the mind of a genius divorced from his cultural milieu? Newton’s enunciation of the Law of Gravity was delayed for twenty years because the then-current figure for the Earth’s diameter was wrong by ten percent. Archimedes almost discovered calculus, but failed because Arabic numerals, invented by some nameless Hindu or group of Hindus, were unknown to him.

“For that matter, the mere existence of a slave society in ancient Greece and Rome meant that machines could scarcely attract much attention-slaves being so much cheaper and more adaptable. And men of true intellect could scarcely be expected to spend their energies on devices intended for manual labor. Even Archimedes, the greatest engineer of antiquity, refused to publish any of his practical inventions-only mathematic abstractions. And when a young man asked Plato of what use geometry was, he was forthwith expelled from the Academy as a man with a mean, unphilosophic soul.

“Science does not plunge forward-it inches along in the directions permitted by the greater forces that mold society and which are in turn molded by society. And no great man advances but on the shoulders of the society that surrounds him—”

The Boss interrupted him at that point. “Suppose you tell us what your part in Tywood’s work was, then. We’ll take your word for it that history cannot be changed.”

“Oh it can, but not purposefully-you see, when Tywood first requested my services in the matter of translating certain textbook passages into Greek, I agreed for the money involved. But he wanted the translation on parchment; he insisted on the use of ancient Greek terminology—the language of Plato, to use his words-regardless of how I had to twist the literal significance of passages, and he wanted it hand-written in rolls.

“I was curious. I, too, found his magazine article. It was difficult for me to jump to the obvious conclusion, since the achievements of modem science transcend the imaginings of philosophy in so many ways. But I learned the truth eventually, and it was at once obvious that Tywood’s theory of changing history was infantile. There are twenty million variables for every instant of time, and no system of mathematics-no mathematic psychohistory, to coin a phrase-has yet been developed to handle that ocean of varying functions.

“In short, any variation of events two thousand years ago would change all subsequent history, but in no predictable way.”

The boss suggested, with a false quietness: “Like the pebble that starts the avalanche, right?”

“Exactly. You have some understanding of the situation, I see. I thought deeply for weeks before I proceeded, and then I realized how I must act-must act.”

There was a low roar. The Boss stood up and his chair went over backward. He swung around his desk, and he had a hand on Boulder’s throat. I was stepping out to stop him, but he waved me back—

He was only tightening the necktie a little. Boulder could still breathe. He had gone very white, and for all the time that the Boss talked, he restricted himself to just that-breathing.

And the Boss said: “Sure, I can see how you decided you must act. I know that some of you brain-sick philosophers think the world needs fixing. You want to throw the dice again and see what turns up. Maybe you don’t even care if you’re alive in the new setup-or that no one can possibly know what you’ve done. But you’re going to create, just the same. You’re going to give God another chance, so to speak.

“Maybe I just want to live-but the world could be worse. In twenty million different ways, it could be worse. A fellow named Wilder once wrote a play called The Skin of Our Teeth. Maybe you’ve read it. Its thesis was that Mankind survived by just that skin of their teeth. No, I’m not going to give you a speech about the Ice Age nearly wiping us out. I don’t know enough. I’m not even going to talk about the Greeks winning at Marathon; the Arabs being defeated at Tours; the Mongols turning back at the last minute without even being defeated-because I’m no historian.

“But take the Twentieth Century. The Germans were stopped at the Marne twice in World War I. Dunkirk happened in World War II, and somehow the Germans were stopped at Moscow and Stalingrad. We could have used the atom bomb in the last war and we didn’t, and just when it looked as if both sides would have to, the Great Compromise happened-just because General Bruce was delayed in taking off from the Ceylon airfield long enough to receive the message directly. One after the other, just like that, all through history-lucky breaks. For every ‘if that didn’t come true that would have made wonder-men of all of us if it had, there were twenty ‘ifs’ that didn’t come true that would have brought disaster to all of us if they had.

“You’re gambling on that one-in-twenty chance-gambling every life on Earth. And you’ve succeeded, too, because Tywood did send that text back.”

He ground out that last sentence, and opened his fist, so that Boulder could fall out and back into his chair.

And Boulder laughed.

“You fool, “ he gasped, bitterly, “How close you can be and yet how widely you can miss the mark. Tywood did send his book back, then? You are sure of that?”

“No chemical textbook in Greek was found on the scene,” said the Boss, grimly, “and millions of calories of energy had disappeared. Which doesn’t change the fact, however, that we have two and a half weeks in which to-make things interesting for you.”

“Oh, nonsense. No foolish dramatics, please. Just listen to me, and try to understand. There were Greek philosophers once, named Leucippus and Democritus, who evolved an atomic theory. All matter, they said, was composed of atoms. Varieties of atoms were distinct and changeless and by their different combinations with each other formed the various substances found in nature. That theory was not the result of experiment or observation. It came into being, somehow, full-grown.

“The didactic Roman poet Lucretius, in his ‘De Rerum Natura,’-‘On the Nature of Things’-elaborated on that theory and throughout manages to sound startlingly modem.

“In Hellenistic times, Hero built a steam engine and weapons of war became almost mechanized. The period has been referred to as an abortive mechanical age, which came to nothing because, somehow, it neither grew out of nor fitted into its social and economic milieu. Alexandrian science was a queer and rather inexplicable phenomenon.

“Then one might mention the old Roman legend about the books of the Sibyl that contained mysterious information direct from the gods

“In other words, gentlemen, while you are right that any change in the course of past events, however trifling, would have incalculable consequences, and while I also believe that you are right in supposing that any random change is much more likely to be for the worse than for the better, I must point out that you are nevertheless wrong in your final conclusions.

“Because THIS is the world in which the Greek chemistry text WAS sent back.

“This has been a Red Queen’s race, if you remember your ‘Through the Looking Glass.’ In the Red Queen’s country, one had to run as fast as one could merely to stay in the same place. And so it was in this case! Tywood may have thought he was creating a new world, but it was I who prepared the translations, and I took care that only such passages as would account for the queer scraps of knowledge the ancients apparently got from nowhere would be included

“And my only intention, for all my racing, was to stay in the same place.”

Three weeks passed; three months; three years. Nothing happened. When nothing happens, you have no proof. We gave up trying to explain, and we ended, the Boss and I, by doubting it ourselves.

The case never ended. Boulder could not be considered a criminal without being considered a world savior as well, and vice versa. He was ignored. And in the end, the case was neither solved, nor closed out; merely put in a file all by itself, under the designation “?” and buried in the deepest vault in Washington.

The Boss is in Washington now; a big wheel. And I’m Regional Head of the Bureau.

Boulder is still assistant professor, though. Promotions are slow at the University.

THE END

“The Red Queen’s Race,” my fifty-eighth story, was the first to be written by Dr. Asimov.

In September I began another story, “Mother Earth,” and submitted it to Campbell on October 12, 1948. After a comparatively small revision of the ending, he took that one, too.