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*** START OF THE PROJECT GUTENBERG EBOOK CHAIN REACTION ***



CHAIN REACTION

By BOYD ELLANBY

Illustrated by DOKTOR

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***Would this be the last poker game—with all
life at stake and every card a mere deuce?***

MacPherson shuffled the cards over and over again. His hands were almost steady.

"Want to place a limit on the bets?" he asked.

His two colleagues who had made the night drive with him from the University said nothing, but Rothman laughed.

"Today?" he said. "Today, the sky's the limit."

MacPherson rested the deck on the table and watched as Rothman stood up to look through the barred window at the glittering Arizona desert. Rothman had got thinner during his months of confinement; his shoulders were bony beneath the gray hospital robe and his balding head looked like a skull.

"Are you going to play?" asked MacPherson. "Or is poker too childish an amusement for a mathematician?"

Rothman turned his back to the window. "Oh, I'll play. When three old friends from the Project suddenly turn up for a visit, even a madman will string along."

Shuffling the cards again, MacPherson wished the other men would say something; it wasn't fair of them to make him carry the conversation. Professor Avery, who had cut his physics classes in order to join the morning's party, sat in glum silence. His plump face was pale, and behind thick-lensed spectacles which enlarged his eyes grotesquely, he blinked as he watched the flickering cards. Dr. Neill, from Physical Chemistry, was tapping his toe against the table leg, watching Rothman, who stood at the window, waiting.

"But we can't have much of a game with only four people," said Rothman. "We ought to have a fifth."

"Maybe we can find someone." MacPherson walked to the locked steel door and rattled the rectangular lattice set in at shoulder height, put his mouth to the metal bars and called out.

"Hey, Joe!"

An attendant in white uniform shuffled into the corridor of closed doors, carrying a tray with one hand and scratching his head with the other.

"How about joining us for a game of poker?"

Joe shook his head and grinned. "Not me, Professor! I start buddying around with the loonies, I lose my job."

"But we're not inmates!"

"Maybe not, but Dr. Rothman is."

"Doesn't prove I'm crazy, Joe," said Rothman. "Conversely, not being inmates doesn't prove these

men are sane."

"It's a fact you don't look any crazier to me than a lot of professors," confessed Joe. "I don't know. All I know is, *I'm* not crazy enough to break the rules and lose my job. Besides, you long-hairs wouldn't stand a chance at poker with me."

Still grinning, he shuffled out of sight down the hall.

MacPherson sighed and went back to the table. "Well, we'll have to get along with just the four of us."

"There's always the unseen guest," said Rothman, "but you won't need to deal him a hand. He already holds all the cards."

Neill looked up. "Stop hamming and sit down. Quit making like a maniac. It's not even a good act."

"Okay." Rothman drew up a chair. "Now what was said about limiting the bets?"

"Why bother setting a limit?" said Neill. "We're not likely to mistake each other for millionaires and we all got exactly the same pay when we were on the Project. Unless your sick pay has had two or three zeros tacked onto it, you're not going to be making any wild bets, and as for the rest of us—"

"University professors are still being paid less than nightclub dancers," said Avery. "You're lucky to be out of the rat race, Rothman. While we worry about how to pay the grocery bill, you can relax, eating and sleeping at government expense. You never had it so good."

"Maybe you'd like to get yourselves committed and keep me company?"

MacPherson rapped the deck on the table. "Stop that kind of talk. We came here to play poker."

"Did you?" asked Rothman, grinning. "Then why don't you deal?"

"Cut, Neill?" said MacPherson. As he shot the slippery cards over the table top, each flick of his thumb watched by Rothman's intent eyes, he regretted this impulsive visit; it now seemed a gesture without meaning. He wondered whether the others were as nervous as he was.

On the drive over from Los Angeles during the night, Neill had seemed calm enough and even Avery, who had changed a lot during work on the Project, had chatted with them unconstrainedly. It was hard to be certain what other men were feeling, even when you had known them a long time, but it could not be pleasant for any of them to be visiting a former colleague who had been removed from the Project directly to a sanitarium.

"Tell me something," said Rothman as he picked up his cards. "Do you still think I'm crazy?"

"Don't be an idiot," MacPherson snapped. "Do you think we'd cut our classes and drive nearly five hundred miles just to play poker with a lunatic?"

"No," said Rothman. "That's how I know. But why aren't you frank about it? Why keep on pretending there wasn't a special reason for your visit?"

Neill was beating his foot against the table leg again and Avery's eyes were hard and staring as he examined his cards.

"Who'll open?" MacPherson asked. "I can't."

"I can," said Rothman. "I'm betting one blue chip. Listen, Avery, why won't you look at me? If you think I'm hamming, what do you call your own act? How long are we going to go on kidding each other? They've shut me up here, but that doesn't mean they've stopped me from logical thinking. My three old friends from the Project don't turn up in the middle of a Friday morning just to calm my fevered brain with a card game."

"What's wrong with poker?" demanded MacPherson.

"Poker? Nothing. I know—it must be the test. Total conversion of matter to energy. Not just a minute percentage any more—*total* conversion. They've finished the set, haven't they? They're ready to test. They're going to disintegrate Waaku, aren't they? It must be today. Then this is the day the world ends. Tell me, when is zero hour?"

Neill's cards had slipped from his fingers and he stooped to the floor, fumbling for them. Avery was bending one corner of a card, creasing it, smoothing it out, and creasing it again. Nobody was going to answer, MacPherson realized. They were leaving it up to him.

He spoke sharply. "You're getting onto forbidden ground, Rothman. You know we're not allowed to discuss the Project with you. We're allowed to visit you only under the strictest promise not to speak of it at all. You're certainly rational enough to understand what the therapists have told you, that you'd get well easily enough if you'd stop worrying. Forget about zero hour. Everything's going to be all right."

Rothman turned to look out the window. "Is it today?"

"How should we know? We're only innocent bystanders now, like you. Remember, we all left the Project over six months ago, except Avery, and last month they let him go."

Neill had rearranged his cards now and he looked at them instead of Rothman as he spoke.

"There's nothing to worry about. Your calculations were wrong. The test is not going to get out of control—if and when they make it. But they don't tell us things any more."

"Since they fired you," said Rothman.

"That's right, since they fired us," Neill said. The creased corner of a card suddenly broke off in his fingers.

"If you didn't believe in my calculations, why did you back me up? I didn't ask you to. If you didn't believe in the danger, why didn't you stay out of the argument and keep your jobs? It wasn't your fight. You could have kept out of it—or attacked me, like Avery."

"All we did was insist that even if you had made a mistake in your calculations, that didn't necessarily prove you were crazy," said Neill. "We didn't know whether you were right or not. We couldn't argue about the math. Avery tore that to pieces and the boys at Columbia and Harvard backed him up. MacPherson and I aren't competent to check your math. To us, you didn't seem any crazier than the people who sent you here. But after you'd scared them silly, they had to do something to stop your scaring other people."

He turned to pick up his cards again, but stopped at the sight of Avery. Avery was standing and crumpling a card spasmodically, his lips were moving without sound, and he was breathing rapidly.

"Look here," said MacPherson. "You'd better change the subject. If little Joe passes by the door and hears us talking about the Project, he'll have our visiting privileges revoked before you can say nuclear fission, and they'll stay revoked forever."

"How long is forever?" asked Rothman.

Avery threw down his cards and walked to the window. Through the bars, there was nothing to be seen but the expanse of sand, glinting in the morning sun, and a cactus plant casting a stubby shadow. He whirled to face the others.

"Look, MacPherson," he burst out. "I'm fed up with this game. Snookums Rothman mustn't think about the Project any more, so we mustn't say the naughty word. But we were all in it together at the beginning and there was a while when we were all every bit as scared as he was. Why not tell him we came this morning in case—just in case—he'd heard about the test and was worrying? What's the harm in telling him what the whole university knows? That zero hour is today, this morning, now!"

"Shut up, you fool!" said MacPherson.

But Rothman glanced at his cards again, then looked up. "When does it begin? What time is it now?"

"Don't answer!" shouted MacPherson. "Are you trying to knock him off balance again?"

"I will answer!" said Avery. "I'm going to tell him. He scared us silly with his calculations; now let us scare him with some cold facts. It'll do him good. Maybe when the test is over, if he finds—I mean *when* he finds—he was wrong, he'll be cured."

"Yes, and maybe he'll really be crazy."

Grabbing Avery fiercely by the arm, MacPherson tried to drag him to the door, but Avery broke away.

"Listen, Rothman!" Avery's breath was coming quick and shallow. "Today is the day! Zero hour is eleven o'clock this morning!"

MacPherson sagged. No one spoke or moved as they all watched Rothman.

At last Rothman sighed, once. "What time is it now?"

From the door came a scratching sound. MacPherson turned to see Joe, grinning at them through the steel lattice.

"How's things?" Joe wanted to know. "Thought I heard a commotion in here. Doc Rothman's not acting up, I hope?"

"Everything's under control, Joe," MacPherson assured him. "Just having a friendly game."

"Don't cheat while they're watching you," said Joe, and his face disappeared.

"Well, the murder's out," said MacPherson.

"No use kidding you any longer," Neill said, fanning his cards. "Eleven o'clock this morning. Six o'clock tomorrow morning, Waaku time. But it's just another test. Nothing's going to happen."

Avery took off his glasses and began to polish the lenses. "Any idea of a possible chain reaction is ridiculous. As a matter of fact, I recently spent a full week checking the math again myself, so I know. But we knew how you felt about it, Rothman, and we didn't want you to be worrying here all alone, in case you'd found out. That's why we came."

Rothman was looking out the window. He did not answer. Slowly MacPherson went back to his chair and picked up his cards. "And now how about playing some poker? Rothman, you opened for a blue. What about you, Neill?"

"I'm staying," said Neill, shoving in a chip. "Always was a gambler. I'm going to stay till the cows come home."

"What time is it?" Rothman asked. "I haven't got a wristwatch. They think I might break the crystal and cut my throat."

MacPherson slammed down his cards and jerked his watch from his pocket. "What does it matter what time it is? Why couldn't they give you a watch with a plastic crystal? If you have to know, it's eleven-forty."

"And thirteen seconds," added Neill.

"Then it's already started," said Rothman.

He leaned his head against the back of his chair and closed his eyes. "It's on its way now. There's somewhat more than a third of the Earth between us and Waaku—the place where Waaku was, I mean. The disintegration wave is moving slowly. The seismic wave of an earthquake would get here in about fifty minutes, more or less. But the shock wave from Waaku, traveling somewhere around five thousand miles an hour, will need about an hour and seventeen minutes, plus or minus a minute or so. That means it will reach us in about thirty-seven minutes from now, and the disintegration wave is following close behind. Well, nice to have known you, fellows. Anyone want to check my math?"

He waved toward the desk behind him, piled high with manuscript and a sprawling heap of books on which rested a slide-rule.

"Calm down," said MacPherson. "Nothing is going to happen. Damn you, Avery! Are you proud of what you accomplished?"

Avery glared. "It'll do him good! He's got to learn to face reality, like the rest of us. In a little more than half an hour, the test will be finished. The world will still be here. Rothman will have to admit his equations were wrong—and then he'll be cured."

Rothman leaned forward. "Or contrariwise, Rothman will *not* have to admit he was wrong and Rothman will *not* be cured! If I made a mistake in my math, why couldn't anybody put his finger on it? I'm not so crazy that I wouldn't be able to see an error in calculus when it was pointed out to me. If you're sure my calculations are wrong, why do you look so frightened?"

"Do we have to go over all that again?" said MacPherson. "The boys at Columbia told you where the mistake was. It's where you inverted that twelve-by-twelve matrix. Didn't you bother to check the inverted matrix?"

"The same old tale." Rothman picked up his cards. "No mathematician will ever admit that another mathematician could invent a method beyond his comprehension. Still harping on an error in my inverted matrix. What time is it now?"



"There's no doubt that your calculations are wrong," said Neill, "but I still don't see why we have to insist on proving it the hard way. With bombs, why do we need to fool around with the total disintegration of matter? Sure, I know the new model releases a googol times the energy you get out of uranium fission, but who cares? There's plenty of uranium for our needs."

"The trouble with uranium is that it doesn't make a big enough bang," said MacPherson. "People aren't impressed by it any more. The same goes for plutonium, even for lithium, at least for any

size bomb we can make. The idea is to show the world something so convincing that they'll never even think of a war again. When they see every island in the Waaku chain wiped off the map, they'll get the point."

Avery creased another card and cleared his throat. "Did you check the inverted twelve-by-twelve, Rothman?"

"I suppose you think I forgot to. Have *you* checked it?"

"Yes, I have. I may not know much math, but I did check it."

"Even after the Columbia boys said it was nonsense? Well, does it come out right?"

"No, it doesn't! You multiply the inverted matrix by the original and you not only don't get zeros for all elements outside the diagonal, you get a haphazard assortment of ones and twos. Worse still, every element in the diagonal comes out equal to zero. The product of the two matrices is about as different from the identity matrix as anything could be. You're one of our most brilliant mathematicians—how could you manage to make so many mistakes in one set of calculations?"

"Did I tell you that was an inverted matrix? Maybe, for this problem, you need something a little more advanced than algebra. Anyhow, if my math is all wrong, why did your first report okay it?"

"What do you mean, my first report?"

"The one you sent to Prexy. The one you later called in and burned. Except Prexy showed it to me and I photostated it. Here." Rothman reached into the pile of papers on his desk and drew out a little envelope. It contained photographic prints. He held one before Avery's glasses. "Does that look familiar?"

Avery drew his hand across his forehead, but did not reply.

"Is that true, Avery?" asked MacPherson. "Did you make a report okaying Rothman's calculations and then withdraw it?"

"Well, what if I did? The report didn't seem to make me much more popular than Rothman was. What if some very influential people in Government explained to Prexy, and he explained to me, just how unpopular that first report might make me? Or suppose they didn't. Maybe I simply didn't find the mistakes in the math until later." Avery kept looking at his cards as he spoke.

"Oh, great," said MacPherson. "Rothman gets put away here, Neill and I lose our jobs, and there's hell to pay in Washington, all because Avery says Rothman's math is full of holes. Now it turns out he wasn't sure and maybe was pressured into it. Grand. Between a screwball and a skunk, I'll choose the screwball. Maybe if Avery had stuck to his guns, there wouldn't have been any test."

"It doesn't matter," said Rothman. "Avery was probably warned to mend his ways. I was. Or maybe he couldn't face the truth. I'm sure he's been much happier, the last few months, believing I'm crazy. Anyway, I don't blame him any more. Maybe my math will soon speak for itself. For your benefit—" he turned to Avery—"I may point out that the errors you said you found affect only the *velocity* of the wave of disintegration. So what if that isn't quite right? The proof that the reaction will be self-sustaining is independent of that."

Avery was white with rage. "The proof, as you called it, that the reaction will be self-sustaining and will consume the entire substance of the Earth doesn't make sense, either. You used D as an operator where it should have been a constant. That's what finally made them certain that you were insane."

There was a rap at the door and Joe poked his head in. "Lunch, Professors! Twelve o'clock, high noon, like they say. How about some turkey sandwiches?"

MacPherson began to sweat; the thought of food made him feel sick.

Was it possible, he wondered, that in spite of everything, he was not quite sure? He looked at Neill and Avery, but they had turned their heads away.

"We won't bother with lunch, Joe," said Rothman.

"Must be a pretty good game if you won't even knock off to eat," said Joe. "Well, will you at least mark your menu for tomorrow?"

"For tomorrow? Tomorrow isn't going to come, you know."

"Nuts," muttered Joe as he closed and locked the door. "Pure nuts."

Avery cleared his throat, and his voice was thin. "Look here, Rothman! If the Universe were composed of matter as unstable as you claim, it would have ceased to exist long ago. Somewhere, somehow, in the infinity of chance events since the creation of the Earth, something would have occurred to start the self-sustaining chain reaction, and all matter would have been annihilated."

"Are you trying to prove something to yourself?" asked Rothman. "Surely you don't equate infinity with a mere four billion years. That's a finite time—long enough for the more dangerous radioactives to disappear completely, of course, but not long enough for all possible chance events to have taken place. Anyway, I never have asserted that the reaction would reach from

Earth to the other planets, or even to the Moon. The Universe, including the Solar System, will still go on. But our old Earth is going up like a pile of magnesium powder mixed with potassium chlorate when you drop a lighted match on it."

Avery wiped his forehead. "I don't know why I keep arguing with a lunatic. But you know yourself that the value you give for the integration constant in those equations is a pure guess, only you spend ten pages of doubletalk trying to hide that fact. If the constant is the one you give, why, sure, then you get a chain reaction. But you made it up! Who ever heard of a constant of that magnitude in the solution of an ordinary differential equation?"

"That's one criticism of my work the Harvard and Columbia boys never mentioned."

"Okay, then I mention it. You're crazy!"

"Are you sure?"

"Positive!"

"Then why can't you forget the approach of zero hour? I'll tell you why and you aren't even making a good show of hiding it. You know that, compared to mine, your knowledge of mathematics is about on a level with that of a college sophomore. Deep down, you know that my calculations were correct. You are convinced—*convinced*—that the bombing of Waaku has already started a chain reaction. And that about seventeen minutes past twelve, around eight minutes from now, the shock wave will reach us, and then the wave of disintegration. Look out of the window! See that cactus in the sand, with its little yellow flower? It will be annihilated. All that desert will go, too—every pebble, every grain of sand. Everything you see, and you yourself, will be disintegrated, transformed into energy!"

Suddenly he relaxed into a grin and softened his voice. "I thought we were playing poker. We're waiting for you to bet. Why don't you at least look at your cards?"

Avery opened his mouth, then closed it, and picked up his hand, riffling the five cards.

"I'm staying," he said. "Here's your blue and I raise you a blue."

Slowly the others picked up their hands and stared at the cards. MacPherson scarcely looked at his as he spoke.

"I'm staying." He picked up the deck. "Cards, gentlemen?"

Rothman shook his head. "I'll play these."

Neill took two. "I like to hold a kicker," he explained.

Avery and MacPherson drew three.

"I opened," said Rothman, "and I'll bet five blue chips."

"See you and raise you a blue," Neill said.

"I'll string along," said Avery.

MacPherson threw his hand in. "I'll let you guys fight it out."

They all looked at Rothman, who was studying his cards.

"I'll see you," he began, and paused. Then he shoved all of his chips into the pot. "I'll see you and raise you a hundred blue chips."

"Damn it Rothman!" MacPherson protested. "I know we agreed on no limit, but if you go on playing like this, you'll lose more than you can afford."

"I've already lost everything," said Rothman, "and so have you. Don't you know what time it is? In a few minutes, none of you will be around to try to collect. What time is it now?"

Avery reached for his watch, then stopped.

Rothman turned his head. "What's that?"

Nobody moved.

A noise like the roar of a swift freight train rushed into the room, rattling the windows. The walls shook, the floor trembled, the slide-rule slid off the pile of books and clattered to the floor.

They jumped to their feet and Avery ran to the window, clutching at the bars.

"Not yet," said Rothman calmly. "The cactus plant will still be there, casting its little shadow. You might as well sit down and finish the game. That was only the shock wave. Have you forgotten that it is transmitted through the Earth faster than the wave of disintegration? We still have a few minutes left. Isn't anybody going to see my bet?"

Avery lurched to the desk, grabbed a remnant of torn paper and scribbled on it

"I'll see you," he yelled, "and raise you a hundred and twenty-five billion blues!"

MacPherson walked to the window. "Look at the sky. This is it."

They all jammed against his back, trying to see the horizon, waiting. Avery dropped the scrap of paper and covered his eyes.

"What is there to see?" Neill whispered.

"I thought—there was a flash...." MacPherson's voice trailed off, and he rubbed his eyes.

"But I didn't see anything," said Neill. "There's nothing to see."

A minute went by. The desert remained calm, the blue sky was unmarked by even a cloud, the air was still.

A second minute went by.

Neill drew out his watch, looked wonderingly at the steady march of the second hand. Then he turned and stumbled into the lavatory. They could hear his dry heaves.

Rothman's eyes wavered from MacPherson to Avery, and back to MacPherson, and he sighed.

"Looks as if I was wrong, gentlemen," he said. "Maybe I am crazy, after all. I wonder if that integration constant could have been wrong." He reached down to the floor to pick up the fallen slide-rule, sat down and drew a pad of paper toward him.

MacPherson leaned against the window, too weak to move. He saw Avery take his hands away from his eyes. He could hear the chattering of Avery's teeth, could hear them click as he clamped them together, trying to control his lips. It seemed a long time before Avery managed to speak.

"*You!*" cried Avery. He lunged forward, grabbed Rothman by the shoulder and jerked him to his feet. "This—will teach you—not to make—mistakes—"

He smashed his fist into Rothman's face.

Still MacPherson could not move, could not even shout. He could only listen to Avery.



"And this will teach you—not to set up matrices—that don't multiply—that burn up—the world—"

Again Avery struck and knocked Rothman to the floor.

Breaking through his paralysis, MacPherson clutched Avery by the shoulder, but Avery kicked at the man on the floor, again and again.

"Avery!" shouted MacPherson. "Snap out of it, man! It's all over! The test is finished. We're still here. Rothman was wrong, just as we always knew he was!"

But Avery was on his knees, pounding Rothman with both fists, sobbing out meaningless words, oblivious to the shouts outside and to MacPherson's tugging.

The door burst open and Joe rushed in, followed by two other attendants.

"What goes on?" After a glance at Avery's contorted face, Joe grabbed for his legs. "Send for the doc, boys. We're going to need help."

One of the men ran down the corridor while Joe and the others succeeded in pulling Avery away from Rothman, who struggled to his feet. A doctor came in with a loaded hypodermic. He gave Avery an injection in the arm.

"Go easy there," said MacPherson. "He'll be all right in a few minutes. He's had a shock, that's all."

"Shock," Avery mumbled.

MacPherson gripped Avery's arm. "Try to relax, man. It's finished. We never believed in it, of course. But I'll admit it's a relief, even to me, to be *sure* there was no danger of a chain reaction

at all."

Suddenly he felt cold.

There was no understanding in Avery's eyes. He slumped to the floor.

"Do you think he'll be all right when he comes out from under the drug?" asked MacPherson.

"I can't say," said the doctor. "I only saw him a few minutes, when you came here this morning. I thought at the time he was pretty disturbed. Much more than Rothman here. Next week, I think, we're going to send Rothman home."

Rothman wiped the blood off his chin and grinned weakly. "You don't mean that, Doc. I used the wrong integration constant in a little calculation. I must be crazy."

*** END OF THE PROJECT GUTENBERG EBOOK CHAIN REACTION ***

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