

Martinez:

Dr. Shields says I need to write personal messages to each of the crew. She says it'll keep me tethered to humanity. I think it's bullshit. But hey, it's an order.

With you, I can be blunt:

If I die, I need you to check on my parents. They'll want to hear about our time on Mars firsthand. I'll need you to do that.

It won't be easy talking to a couple about their dead son. It's a lot to ask; that's why I'm asking you. I'd tell you you're my best friend and stuff, but it would be lame.

I'm not giving up. Just planning for every outcome. It's what I do.

...

GUO MING, director of the China National Space Administration, examined the daunting pile of paperwork at his desk. In the old days, when China wanted to launch a rocket, they just launched it. Now they were compelled by international agreements to warn other nations first.

It was a requirement, Guo Ming noted to himself, that did not apply to the United States. To be fair, the Americans publicly announced their launch schedules well in advance, so it amounted to the same thing.

He walked a fine line filling out the form: making the launch date and flight path clear, while doing everything possible to "conceal state secrets."

He snorted at the last requirement. "Ridiculous," he mumbled. The *Taiyang Shen* had no strategic or military value. It was an unmanned probe that would be in Earth orbit less than two days. After that, it would travel to a solar orbit between Mercury and Venus. It would be China's first heliology probe to orbit the sun.

Yet the State Council insisted all launches be shrouded in secrecy. Even launches with nothing to hide. This way, other nations could not infer from lack of openness which launches contained classified payloads.

A knock at the door interrupted his paperwork.

“Come,” Guo Ming said, happy for the interruption.

“Good evening, sir,” said Under Director Zhu Tao.

“Tao, welcome back.”

“Thank you, sir. It’s good to be back in Beijing.”

“How were things at Jiuquan?” asked Guo Ming. “Not too cold, I hope? I’ll never understand why our launch complex is in the middle of the Gobi Desert.”

“It was cold, yet manageable,” Zhu Tao said.

“And how are launch preparations coming along?”

“I am happy to report they are all on schedule.”

“Excellent.” Guo Ming smiled.

Zhu Tao sat quietly, staring at his boss.

Guo Ming looked expectantly back at him, but Zhu Tao neither stood to leave nor said anything further.

“Something else, Tao?” Guo Ming asked.

“Mmm,” Zhu Tao said. “Of course, you’ve heard about the Iris probe?”

“Yes, I did,” Guo frowned. “Terrible situation. That poor man’s going to starve.”

“Possibly,” Zhu Tao said. “Possibly not.”

Guo Ming leaned back in his chair. “What are you saying?”

“It’s the *Taiyang Shen*’s booster, sir. Our engineers have run the numbers, and it has enough fuel for a Mars injection orbit. It could get there in four hundred and nineteen days.”

“Are you kidding?”

“Have you ever known me to ‘kid,’ sir?”

Guo Ming stood and pinched his chin. Pacing, he said, “We can really send the *Taiyang Shen* to Mars?”

“No, sir,” said Zhu Tao. “It’s far too heavy. The massive heat shielding makes it the heaviest unmanned probe we’ve ever built. That’s why the booster had to be so powerful. But a lighter payload could be sent all the way to Mars.”

“How much mass could we send?” Guo Ming asked.

“Nine hundred and forty-one kilograms, sir.”

“Hmm,” Guo Ming said, “I bet NASA could work with that limitation. Why haven’t they approached us?”

“Because they don’t know,” Zhu Tao said. “All our booster technology is classified information. The Ministry of State Security even spreads disinformation about our capabilities. This is for obvious reasons.”

“So they don’t *know* we can help them,” Guo Ming said. “If we decide not to help, no one will know we could have.”

“Correct, sir.”

“For the sake of argument, let’s say we decided to help. What then?”

“Time would be the enemy, sir,” Zhu Tao answered. “Based on travel duration and the supplies their astronaut has remaining, any such probe would have to be launched within a month. Even then he would starve a little.”

“That’s right around when we planned to launch *Taiyang Shen*.”

“Yes, sir. But it took them two months to build Iris, and it was so rushed it failed.”

“That’s their problem,” Guo Ming said. “Our end would be providing the booster. We’d launch from Jiuquan; we can’t ship an eight-hundred-ton rocket to Florida.”

“Any agreement would hinge on the Americans reimbursing us for the booster,” Zhu Tao said, “and the State Council would likely want political favors from the US government.”

“Reimbursement would be pointless,” Guo Ming said. “This was an expensive project, and the State Council grumbled about it all along. If they had a bulk payout for its value, they’d just keep it. We’d never get to build another one.”

He clasped his hands behind his back. “And the American people may be sentimental, but their government is not. The US State Department won’t trade anything major for one man’s life.”

“So it’s hopeless?” asked Zhu Tao.

“Not hopeless,” Guo Ming corrected. “Just hard. If this becomes a negotiation by diplomats, it will never be resolved. We need to keep this among scientists. Space agency to space agency. I’ll get a translator and call NASA’s administrator. We’ll work out an agreement, then present it to our governments as a *fait accompli*.”

“But what can they do for us?” Zhu Tao asked. “We’d be giving up a booster and effectively canceling *Taiyang Shen*.”

Guo Ming smiled. “They’ll give us something we can’t get without them.”

“And that is?”

“They’ll put a Chinese astronaut on Mars.”

Zhu Tao stood. “Of course.” He smiled. “The Ares 5 crew hasn’t even been selected yet. We’ll insist on a crewman. One we get to pick and train. NASA and the US State Department would surely accept that. But will our State Council?”

Guo Ming smiled wryly. “Publicly rescue the Americans? Put a Chinese astronaut on Mars? Have the world see China as equal to the US in space? The State Council would sell their own *mothers* for that.”

...

TEDDY LISTENED to the phone at his ear. The voice on the other end finished what it had to say, then fell silent as it awaited an answer.

He stared at nothing in particular as he processed what he'd just heard.

After a few seconds, he replied, "Yes."

...

Johanssen:

Your poster outsold the rest of ours combined. You're a hot chick who went to Mars. You're on dorm-room walls all over the world.

Looking like that, why are you such a nerd? And you are, you know. A serious nerd. I had to do some computer shit to get Pathfinder talking to the rover and oh my god. And I had NASA telling me what to do every step of the way.

You should try to be more cool. Wear dark glasses and a leather jacket. Carry a switchblade. Aspire to a level of coolness known only as... "Botanist Cool."

Did you know Commander Lewis had a chat with us men? If anyone hit on you, we'd be off the mission. I guess after a lifetime of commanding sailors, she's got an unfairly jaded view.

Anyway, the point is you're a nerd. Remind me to give you a wedgie next time I see you.

...

"OKAY, HERE we are again," said Bruce to the assembled heads of JPL. "You've all heard about the *Taiyang Shen*, so you know our friends in China have given us one more chance. But this time, it's going to be harder.

"*Taiyang Shen* will be ready to launch in twenty-eight days. If it launches on time, our payload will get to Mars on Sol 624, six weeks after Watney's expected to run out of food. NASA's already working on ways to stretch his supply.

“We made history when we finished Iris in sixty-three days. Now we have to do it in *twenty-eight*.”

He looked across the table to the incredulous faces.

“Folks,” he said, “this is going to be the most ‘ghetto’ spacecraft ever built. There’s only one way to finish that fast: no landing system.”

“Sorry, what?” Jack Trevor stammered.

Bruce nodded. “You heard me. No landing system. We’ll need guidance for in-flight course adjustments. But once it gets to Mars, it’s going to crash.”

“That’s crazy!” Jack said. “It’ll be going an *insane* velocity when it hits!”

“Yep,” Bruce said. “With ideal atmospheric drag, it’ll impact at three hundred meters per second.”

“What good will a pulverized probe do Watney?” Jack asked.

“As long as the food doesn’t burn up on the way in, Watney can eat it,” Bruce said.

Turning to the whiteboard, he began drawing a basic organizational chart. “I want two teams,” he began.

“Team One will make the outer shell, guidance system, and thrusters. All we need is for it to get to Mars. I want the safest possible system. Aerosol propellant would be best. High-gain radio so we can talk to it, and standard satellite navigational software.

“Team Two will deal with the payload. They need to find a way to contain the food during impact. If protein bars hit sand at three hundred meters per second, they’ll make protein-scented sand. We need them *edible* after impact.

“We can weigh nine hundred and forty-one kilograms. At least three hundred of that needs to be food. Get crackin’.”

...

“UH, DR. KAPOOR?” Rich said, peeking his head into Venkat’s office. “Do you have a minute?”

Venkat gestured him in. “You are...?”

“Rich, Rich Purnell,” he said, shuffling into the office, his arms wrapped around a sheaf of disorganized papers. “From astrodynamics.”

“Nice to meet you,” Venkat said. “What can I do for you, Rich?”

“I came up with something a while ago. Spent a lot of time on it.” He dumped the papers on Venkat’s desk. “Lemme find the summary....”

Venkat stared forlornly at his once-clean desk, now strewn with scores of printouts.

“Here we go!” Rich said triumphantly, grabbing a paper. Then his expression saddened. “No, this isn’t it.”

“Rich,” Venkat said. “Maybe you should just tell me what this is about?”

Rich looked at the mess of papers and sighed. “But I had such a cool summary....”

“A summary for what?”

“How to save Watney.”

“That’s already in progress,” Venkat said. “It’s a last-ditch effort, but—”

“The *Taiyang Shen*?” Rich snorted. “That won’t work. You can’t make a Mars probe in a month.”

“We’re sure as hell going to try,” Venkat said, a note of annoyance in his voice.

“Oh, sorry, am I being difficult?” Rich asked. “I’m not good with people. Sometimes I’m difficult. I wish people would just tell me. Anyway, the *Taiyang Shen* is critical. In fact, my idea won’t work without it. But a Mars probe? Pfft. C’mon.”

“All right,” Venkat said. “What’s your idea?”

Rich snatched a paper from the desk. “Here it is!” He handed it to Venkat with a childlike smile.

Venkat took the summary and skimmed it. The more he read, the wider his eyes got. “Are you sure about this?”

“Absolutely!” Rich beamed.

“Have you told anyone else?”

“Who would I tell?”

“I don’t know,” Venkat said. “Friends?”

“I don’t have any of those.”

“Okay, keep it under your hat.”

“I don’t wear a hat.”

“It’s just an expression.”

“Really?” Rich said. “It’s a stupid expression.”

“Rich, you’re being difficult.”

“Ah. Thanks.”

...

Vogel:

Being your backup has backfired.

I guess NASA figured botany and chemistry are similar because they both end in “Y,” One way or another, I ended up being your backup chemist.

Remember when they made you spend a day explaining your experiments to me? It was in the middle of intense mission prep. You may have forgotten.

You started my training by buying me a beer. For breakfast. Germans are awesome.

Anyway, now that I have time to kill, NASA gave me a pile of work. And all your chemistry crap is on the list. So now I have to do boring-ass experiments with test tubes and soil and pH levels and  
*Zzzzzzzzzzz...*



My life is now a desperate struggle for survival...with occasional titration.

Frankly, I suspect you're a super-villain. You're a chemist, you have a German accent, you had a base on Mars...what more can there be?

...

"WHAT THE fuck is 'Project Elrond'?" Annie asked.

"I had to make something up," Venkat said.

"So you came up with 'Elrond'?" Annie pressed.

"Because it's a secret meeting?" Mitch guessed. "The e-mail said I couldn't even tell my assistant."

"I'll explain everything once Teddy arrives." Venkat said.

"Why does 'Elrond' mean 'secret meeting'?" Annie asked.

"Are we going to make a momentous decision?" Bruge Ng asked.

"Exactly," Venkat said.

"How did you know that?" Annie asked, getting annoyed.

"Elrond," Bruce said. "The Council of Elrond. From *Lord of the Rings*. It's the meeting where they decide to destroy the One Ring."

"Jesus," Annie said. "*None* of you got laid in high school, did you?"

"Good morning," Teddy said as he walked into the conference room. Seating himself, he rested his hands on the table. "Anyone know what this meeting's about?" he asked.

"Wait," Mitch said, "*Teddy* doesn't even know?"

Venkat took a deep breath. "One of our astrodynamicists, Rich Purnell, has found a way to get *Hermes* back to Mars. The course he came up with would give *Hermes* a Mars flyby on Sol 549."

Silence.

“You shittin’ us?” Annie demanded.

“Sol 549? How’s that even possible?” asked Bruce. “Even Iris wouldn’t have landed till Sol 588.”

“Iris is a point-thrust craft,” Venkat said. “*Hermes* has a constant-thrust ion engine. It’s always accelerating. Also, *Hermes* has a *lot* of velocity right now. On their current Earth-intercept course, they have to decelerate for the next month just to slow down to Earth’s speed.”

Mitch rubbed the back of his head. “Wow...549. That’s thirty-five sols before Watney runs out of food. That would solve everything.”

Teddy leaned forward. “Run us through it, Venkat. What would it entail?”

“Well,” Venkat began, “if they did this ‘Rich Purnell Maneuver,’ they’d start accelerating right away, to preserve their velocity and gain even more. They wouldn’t intercept Earth at all, but would come close enough to use a gravity assist to adjust course. Around that time, they’d pick up a resupply probe with provisions for the extended trip.

“After that, they’d be on an accelerating orbit toward Mars, arriving on Sol 549. Like I said, it’s a Mary *flyby*. This isn’t anything like a normal Ares mission. They’ll be going too fast to fall into orbit. The rest of the maneuver takes them back to Earth. They’d be home two hundred and eleven days after the flyby.”

“What good is a flyby?” Bruce asked. “They don’t have any way to get Watney off the surface.”

“Yeah...,” Venkat said. “Now for the unpleasant part: Watney would have to get to the Ares 4 MAV.”

“Schiaparelli!?” Mitch gaped. “That’s thirty-two hundred kilometers away!”

“Three thousand, two hundred, and thirty-five kilometers to be exact,” Venkat said. “It’s not out of the question. He drove

to *Pathfinder*'s landing site and back. That's over fifteen hundred kilometers."

"That was over flat, desert terrain," Bruce chimed in, "but the trip to Schiaparelli—"

"Suffice it to say," Venkat interrupted, "it would be very difficult and dangerous. But we have a lot of clever scientists to help him trick out the rover. Also there would be MAV modifications."

"What's wrong with the MAV?" Mitch asked.

"It's designed to get to low Mars orbit," Venkat explained. "But *Hermes* would be on a flyby, so the MAV would have to escape Mars gravity entirely to intercept."

"How?" Mitch asked.

"It'd have to lose weight...a *lot* of weight. I can get rooms full of people working on these problems, if we decide to do this."

"Earlier," Teddy said, "you mentioned a supply probe for *Hermes*. We have that capability?"

"Yes, with the *Taiyang Shen*," Venkat said. "We'd shoot for a near-Earth rendezvous. It's a lot easier than getting a probe to Mars, that's for sure."

"I see," Teddy said. "So we have two options on the table: Send Watney enough food to last until Ares 4, or send *Hermes* back to get him right now. Both plans require the *Taiyang Shen*, so we can only do one."

"Yes," Venkat said. "We'll have to pick one."

They all took a moment to consider.

"What about the *Hermes* crew?" Annie asked, breaking the silence. "Would they have a problem with adding..." She did some quick math in her head. "Five hundred and thirty-three days to their mission?"

"They wouldn't hesitate," Mitch said. "Not for a second. That's why Venkat called this meeting." He glared at Venkat.

“He wants us to decide instead.”

“That’s right,” Venkat said.

“It should be Commander Lewis’s call,” Mitch said.

“Pointless to even ask her,” Venkat said. “*We* need to make this decision; it’s a matter of life and death.”

“She’s the mission commander,” Mitch said. “Life-and-death decisions are her damn job.”

“Easy, Mitch,” Teddy said.

“Bullshit,” Mitch said. “You guys have done end runs around the crew every time something goes wrong. You didn’t tell them Watney was still alive; now you’re not telling them there’s a way to save him.”

“We already have a way to keep him alive,” Teddy said. “We’re just discussing another one.”

“The crash-lander?” Mitch said. “Does anyone think that’ll work? Anyone?”

“All right, Mitch,” Teddy said. “You’ve expressed your opinion, and we’ve heard it. Let’s move on.” He turned to Venkat. “Can *Hermes* function for five hundred and thirty-three days beyond the scheduled mission end?”

“It should,” Venkat said. “The crew may have to fix things here and there, but they’re well trained. Remember, *Hermes* was made to do all five Ares missions. It’s only halfway through its designed life span.”

“It’s the most expensive thing ever built,” Teddy said. “We can’t make another one. If something went wrong, the crew would die, and the Ares Program with them.”

“Losing the crew would be a disaster,” Venkat said. “But we wouldn’t lose *Hermes*. We can remotely operate it. So long as the reactor and ion engines continued to work, we could bring it back.”

“Space travel is dangerous,” Mitch said. “We can’t make this a discussion about what’s safest.”

“I disagree,” Teddy said. “This is *absolutely* a discussion about what’s safest. And about how many lives are at stake. Both plans are risky, but resupplying Watney only risks one life while the Rich Purnell Maneuver risks six.”

“Consider *degree* of risk, Teddy,” Venkat said. “Mitch is right. The crash-lander is high-risk. It could miss Mars, it could reenter wrong and burn up, it could crash too hard and destroy the food...We estimate a thirty percent chance of success.”

“A near-Earth rendezvous with *Hermes* is more doable?” Teddy asked.

“Much more doable,” Venkat confirmed. “With sub-second transmission delays, we can control the probe directly from Earth rather than rely on automated systems. When the time comes to dock, Major Martinez can pilot it remotely from *Hermes* with no transmission delay at all. And *Hermes* has a human crew, able to overcome any hiccups that may happen. And we don’t have to do a reentry; the supplies don’t have to survive a three-hundred-meters-per-second impact.”

“So,” Bruce offered, “we can have a high chance of killing one person, or a low chance of killing six people. Jeez. How do we even make this decision?”

“We talk about it, then Teddy makes the decision,” Venkat said. “Not sure what else we can do.”

“We could let Lewis—” Mitch began.

“Yeah, other than that,” Venkat interrupted.

“Question,” Annie said. “What am I even here for? This seems like something for you nerds to discuss.”

“You need to be in the loop,” Venkat said. “We’re not deciding right now. We’ll need to quietly research the details internally. Something might leak, and you need to be ready to dance around questions.”

“How long have we got to make a decision?” Teddy asked.

“The window for starting the maneuver ends in thirty-nine hours.”

“All right,” Teddy said. “Everyone, we discuss this only in person or on the phone; never e-mail. And don’t talk to *anyone* about this, other than the people here. The last thing we need is public opinion pressing for a risky cowboy rescue that may be impossible.”

...

Beck:

Hey, man. How ya been?

Now that I’m in a “dire situation,” I don’t have to follow social rules anymore. I can be honest with everyone.

Bearing that in mind, I have to say...dude...you need to tell Johanssen how you feel. If you don’t, you’ll regret it forever.

I won’t lie: It could end badly. I have no idea what she thinks of you. Or of anything. She’s weird.

But wait till the mission’s over. You’re on a ship with her for another two months. Also, if you guys got up to anything while the mission was in progress, Lewis would kill you.

...

VENKAT, MITCH, Annie, Bruce, and Teddy met for the second time in as many days. “Project Elrond” had taken on a dark connotation throughout the Space Center, veiled in secrecy. Many people knew the name, none knew its purpose.

Speculation ran rampant. Some thought it was a completely new program in the works. Others worried it might be a move to cancel Ares 4 and 5. Most thought it was Ares 6 in the works.

“It wasn’t an easy decision,” Teddy said to the assembled elite. “But I’ve decided to go with Iris 2. No Rich Purnell Maneuver.”

Mitch slammed his fist on the table.

“We’ll do all we can to make it work,” Bruce said.

“If it’s not too much to ask,” Venkat began, “what made up your mind?”

Teddy sighed. “It’s a matter of risk,” he said. “Iris 2 only risks one life. Rich Purnell risks all six of them. I know Rich Purnell is more likely to work, but I don’t think it’s six times more likely.”

“You coward,” Mitch said.

“Mitch...,” Venkat said.

“You god damned coward,” Mitch continued, ignoring Venkat. “You just want to cut your losses. You’re on damage control. You don’t give a shit about Watney’s life.”

“Of course I do,” Teddy replied. “And I’m sick of your infantile attitude. You can throw all the tantrums you want, but the rest of us have to be adults. This isn’t a TV show; the riskier solution isn’t always the best.”

“Space is dangerous,” Mitch snapped. “It’s what we do here. If you want to play it safe all the time, go join an insurance company. And by the way, it’s not even your life you’re risking. The crew can make up their own minds about it.”

“No, they can’t,” Teddy fired back. “They’re too emotionally involved. Clearly, so are you. I’m not gambling five additional lives to save one. Especially when we might save him without risking them at all.”

“Bullshit!” Mitch shot back as he stood from his chair. “You’re just *convincing* yourself the crash-lander will work so you don’t have to take a risk. You’re hanging him out to dry, you chickenshit son of a bitch!”

He stormed out of the room, slamming the door behind him.

After a few seconds, Venkat followed behind, saying, “I’ll make sure he cools off.”

Bruce slumped in his chair. “Sheesh,” he said nervously. “We’re scientists, for Christ’s sake. What the hell!?”

Annie quietly gathered her things and placed them in her briefcase.

Teddy looked to her. “Sorry about that, Annie,” he said. “What can I say? Sometimes men let testosterone take over—”

“I was hoping he’d kick your ass,” she interrupted.

“What?”

“I know you care about the astronauts, but he’s right. You *are* a fucking coward. If you had balls, we might be able to save Watney.”

...

Lewis:

Hi, Commander.

Between training and our trip to Mars, I spent two years working with you. I think I know you pretty well. So I’m guessing you still blame yourself for my situation, despite my earlier e-mail asking you not to.

You were faced with an impossible scenario and made a tough decision. That’s what commanders do. And your decision was right. If you’d waited any longer, the MAV would have tipped.

I’m sure you’ve run through all the possible outcomes in your head, so you know there’s nothing you could have done differently (other than “be psychic”).

You probably think losing a crewman is the worst thing that can happen. Not true. Losing the whole crew is worse. You kept that from happening.

But there’s something more important we need to discuss: What is it with you and disco? I can understand the ’70s TV because everyone loves hairy people with huge collars. But disco?

Disco!?

...



VOGEL CHECKED the position and orientation of *Hermes* against the projected path. It matched, as usual. In addition to being the mission's chemist, he was also an accomplished astrophysicist. Though his duties as navigator were laughably easy.

The computer knew the course. It knew when to angle the ship so the ion engines would be aimed correctly. And it knew the location of the ship at all times (easily calculated from the position of the sun and Earth, and knowing the exact time from an on-board atomic clock).

Barring a complete computer failure or other critical event, Vogel's vast knowledge of astrodynamics would never come into play.

After completing the check, he ran a diagnostic on the engines. They were functioning at peak. He did all this from his quarters. All onboard computers could control all ships' functions. Gone were the days of physically visiting the engines to check up on them.

Having completed his work for the day, he finally had time to read e-mail.

Sorting through the messages NASA deemed worthy to upload, he read the most interesting first and responded when necessary. His responses were cached and would be sent to Earth with Johanssen's next uplink.

A message from his wife caught his attention. Titled "*unsere kinder*" ("our children"), it contained nothing but an image attachment. He raised an eyebrow. Several things stood out at once. First, "kinder" should have been capitalized. Helena, a grammar school teacher in Bremen, was very unlikely to make that mistake. Also, to each other, they affectionately called their kids *die Affen*.

When he tried to open the image, his viewer reported that the file was unreadable.

He walked down the narrow hallway. The crew quarters stood against the outer hull of the constantly spinning ship to

maximize simulated gravity. Johanssen's door was open, as usual.

"Johanssen. Good evening," Vogel said. The crew kept the same sleep schedule, and it was nearing bedtime.

"Oh, hello," Johanssen said, looking up from her computer.

"I have the computer problem," Vogel explained. "I wonder if you will help."

"Sure," she said.

"You are in the personal time," Vogel said. "Perhaps tomorrow when you are on the duty is better?"

"Now's fine," she said. "What's wrong?"

"It is a file. It is an image, but my computer cannot view."

"Where's the file?" she asked, typing on her keyboard.

"It is on my shared space. The name is 'kinder.jpg.'"

"Let's take a look," she said.

Her fingers flew over her keyboard as windows opened and closed on her screen. "Definitely a bad jpg header," she said. "Probably mangled in the download. Lemme look with a hex editor, see if we got anything at all...."

After a few moments she said, "This isn't a jpeg. It's a plain ASCII text file. Looks like...well, I don't know what it is. Looks like a bunch of math formulae." She gestured to the screen. "Does any of this make sense to you?"

Vogel leaned in, looking at the text. "*Ja*," he said. "It is a course maneuver for *Hermes*. It says the name is 'Rich Purnell Maneuver.'"

"What's that?" Johanssen asked.

"I have not heard of this maneuver." He looked at the tables. "It is complicated...very complicated...."

He froze. "Sol 549!?" he exclaimed. "*Mein Gott!*"

...

THE HERMES crew enjoyed their scant personal time in an area called “the Rec.” Consisting of a table and barely room to seat six, it ranked low in gravity priority. Its position amidships granted it a mere 0.2 g.

Still, it was enough to keep everyone in a seat as they pondered what Vogel told them.

“...and then mission would conclude with Earth intercept two hundred and eleven days later,” he finished up.

“Thank you, Vogel,” Lewis said. She’d heard the explanation earlier when Vogel came to her, but Johanssen, Martinez, and Beck were hearing it for the first time. She gave them a moment to digest.

“Would this really work?” Martinez asked.

“*Ja.*” Vogel nodded. “I ran the numbers. They all check out. It is brilliant course. Amazing.”

“How would he get off Mars?” Martinez asked.

Lewis leaned forward. “There was more in the message,” she began. “We’d have to pick up a supply near Earth, and he’d have to get to Ares 4’s MAV.”

“Why all the cloak and dagger?” Beck asked.

“According to the message,” Lewis explained, “NASA rejected the idea. They’d rather take a big risk on Watney than a small risk on all of us. Whoever snuck it into Vogel’s e-mail obviously disagreed.”

“So,” Martinez said, “we’re talking about going directly against NASA’s decision?”

“Yes,” Lewis confirmed, “that’s exactly what we’re talking about. If we go through with the maneuver, they’ll have to send the supply ship or we’ll die. We have the opportunity to force their hand.”

“Are we going to do it?” Johanssen asked.

They all looked to Lewis.

“I won’t lie,” she said. “I’d sure as hell like to. But this isn’t a normal decision. This is something NASA expressly rejected. We’re talking about mutiny. And that’s not a word I throw around lightly.”

She stood and paced slowly around the table. “We’ll only do it if we all agree. And before you answer, consider the consequences. If we mess up the supply rendezvous, we die. If we mess up the Earth gravity assist, we die.

“If we do everything perfectly, we add five hundred and thirty-three days to our mission. Five hundred and thirty-three days of unplanned space travel where anything could go wrong. Maintenance will be a hassle. Something might break that we can’t fix. If it’s life-critical, we die.”

“Sign me up!” Martinez smiled.

“Easy, cowboy,” Lewis said. “You and I are military. There’s a good chance we’d be court-martialed when we got home. As for the rest of you, I guarantee they’ll never send you up again.”

Martinez leaned against the wall, arms folded with a half grin on his face. The rest silently considered what their commander had said.

“If we do this,” Vogel said, “it would be over one thousand days of space. This is enough space for a life. I do not need to return.”

“Sounds like Vogel’s in,” Martinez grinned. “Me, too, obviously.”

“Let’s do it,” Beck said.

“If you think it’ll work,” Johanssen said to Lewis, “I trust you.”

“Okay,” Lewis said. “If we go for it, what’s involved?”

Vogel shrugged. “I plot the course and execute it,” he said. “What else?”

“Remote override,” Johanssen said. “It’s designed to get the ship back if we all die or something. They can take over *Hermes* from Mission Control.”

“But we’re right here,” Lewis said. “We can undo whatever they try, right?”

“Not really,” Johanssen said. “Remote override takes priority over any onboard controls. It assumes there’s been a disaster and the ship’s control panels can’t be trusted.”

“Can you disable it?” Lewis asked.

“Hmm...” Johanssen pondered. “*Hermes* has four redundant flight computers, each connected to three redundant comm systems. If any computer gets a signal from any comm system, Mission Control can take over. We can’t shut down the comms; we’d lose telemetry and guidance. We can’t shut down the computers; we need them to control the ship. I’ll have to disable the remote override on each system.... It’s part of the OS; I’ll have to jump over the code.... Yes. I can do it.”

“You’re sure?” Lewis asked. “You can turn it off?”

“Shouldn’t be hard,” Johanssen said. “It’s an emergency feature, not a security program. It isn’t protected against malicious code.”

“Malicious code?” Beck smiled. “So...you’ll be a hacker?”

“Yeah.” Johanssen smiled back. “I guess I will.”

“All right,” Lewis said. “Looks like we can do it. But I don’t want peer pressure forcing anyone into it. We’ll wait for twenty-four hours. During that time, anyone can change their mind. Just talk to me in private or send me an e-mail. I’ll call it off and never tell anyone who it was.”

Lewis stayed behind as the rest filed out. Watching them leave, she saw they were smiling. All four of them. For the first time since leaving Mars, they were back to their old selves. She knew right then no one’s mind would change.

They were going back to Mars.

...

EVERYONE KNEW Brendan Hutch would be running missions soon.

He'd risen through NASA's ranks as fast as one could in the large, inertia-bound organization. He was known as a diligent worker, and his skill and leadership qualities were plain to all his subordinates.

Brendan was in charge of Mission Control from one a.m. to nine a.m. every night. Continued excellent performance in this role would certainly net him a promotion. It had already been announced he'd be backup flight controller for Ares 4, and he had a good shot at the top job for Ares 5.

"Flight, CAPCOM," a voice said through his headset.

"Go, CAPCOM," Brendan responded. Though they were in the same room, radio protocol was observed at all times.

"Unscheduled status update from *Hermes*."

With *Hermes* ninety light-seconds away, back-and-forth voice communication was impractical. Other than media relations, *Hermes* would communicate via text until they were much closer.

"Roger," Brendan said. "Read it out."

"I...I don't get it, Flight," came the confused reply. "No real status, just a single sentence."

"What's it say?"

"Message reads: 'Houston, be advised: Rich Purnell is a steely-eyed missile man.'"

"What?" Brendan asked. "Who the hell is Rich Purnell?"

"Flight, Telemetry," another voice said.

"Go, Telemetry," Brendan said.

"*Hermes* is off course."

"CAPCOM, advise *Hermes* they're drifting. Telemetry, get a correction vector ready—"

“Negative, Flight,” Telemetry interrupted. “It’s not drift. They adjusted course. Instrumentation uplink shows a deliberate 27.812- degree rotation.”

“What the hell?” Brendan stammered. “CAPCOM, ask them what the hell.”

“Roger, Flight...message sent. Minimum reply time three minutes, four seconds.”

“Telemetry, any chance this is instrumentation failure?”

“Negative, Flight. We’re tracking them with SatCon. Observed position is consistent with the course change.”

“CAPCOM, read your logs and see what the previous shift did. See if a massive course change was ordered and somehow nobody told us.”

“Roger, Flight.”

“Guidance, Flight,” Brendan said.

“Go, Flight,” was the reply from the guidance controller.

“Work out how long they can stay on this course before it’s irreversible. At what point will they no longer be able to intercept Earth?”

“Working on that now, Flight.”

“And somebody find out who the hell Rich Purnell is!”

...

MITCH PLOPPED down on the couch in Teddy’s office. He put his feet up on the coffee table and smiled at Teddy. “You wanted to see me?”

“Why’d you do it, Mitch?” Teddy demanded.

“Do what?”

“You know damn well what I’m talking about.”

“Oh, you mean the *Hermes* mutiny?” Mitch said innocently. “You know, that’d make a good movie title. *The Hermes Mutiny*. Got a nice ring to it.”

“We know you did it,” Teddy said sternly. “We don’t know how, but we know you sent them the maneuver.”

“So you don’t have any proof.”

Teddy glared. “No. Not yet, but we’re working on it.”

“Really?” Mitch said. “Is that *really* the best use of our time? I mean, we have a near-Earth resupply to plan, not to mention figuring out how to get Watney to Schiaparelli. We’ve got a lot on our plates.”

“You’re damn right we have a lot on our plates!” Teddy fumed. “After your little stunt, we’re committed to this thing.”

“*Alleged* stunt,” Mitch said, raising a finger. “I suppose Annie will tell the media we decided to try this risky maneuver? And she’ll leave out the mutiny part?”

“Of course,” Teddy said. “Otherwise we’d look like idiots.”

“I guess everyone’s off the hook then!” Mitch smiled. “Can’t fire people for enacting NASA policy. Even Lewis is fine. What mutiny? And maybe Watney gets to live. Happy endings all around!”

“You may have killed the whole crew,” Teddy countered. “Ever think of that?”

“*Whoever* gave them the maneuver,” Mitch said, “only passed along information. Lewis made the decision to act on it. If she let emotion cloud her judgment, she’d be a shitty commander. And she’s not a shitty commander.”

“If I can ever prove it was you, I’ll find a way to fire you for it,” Teddy warned.

“Sure.” Mitch shrugged. “But if I wasn’t willing to take risks to save lives, I’d...” He thought for a moment. “Well, I guess I’d be you.”