# Not Far Enough

## Martin L. Shoemaker

*Carver, Aames, and Smith have previously appeared in the pages of* Analog *in "Brigas Nunca Mais" (March 2015) and "Murder on the* Aldrin *Express" (September 2013).*

---

### 1. Descent Stage

"Carver!" the captain shouted through the comm. Lander 2 bucked and dove in the Martian turbulence. A rumble like distant thunder sounded through the hull. "Pick that nose up. Fight that wind. Use some juice if you have to! I don't want to scrape you all off of Mars."

But it was Chief Maxwell who answered, safe in Control Bay 2 up on the *Bradbury:* "I'm on it." I bounced against my seat and then up against my straps as the lander's nose *kicked* upward. "Doppler says there's a calm pocket behind this gust, we just have to slide over to it."

The expedition had started fine. The eight-month trip on the *Bradbury* was routine for a crew of experienced spacers: maintenance, training, experiments, and briefings. Indoctrination sessions, really, but the brass were subtler than that. The System Initiative hired the best headshrinkers to *make* it subtle. That was all the fault of Masha Desney—my hero!—and Bennie Cooper.

I heard the captain's sneer in his response. "Glad *somebody* is awake over there. Carver, open your damned eyes! Do you want another collision?"

That was unfair to Anson Carver—his Lieutenant Junior Grade bars still new—but "fair" doesn't describe Captain Aames. He'll push 'til he gets your best—or you break. Carver had had a collision during pilot training, and Aames brought it up when he wanted to push the man. Carver's helmet monitor showed sweat on his dark brown forehead, but his eyes were focused and steely. Carver wouldn't break, I was sure of that. He was doing great considering he had worries that Max didn't. Our landers used the system invented by the First *Bradbury* crew: a pilot in a skinsuit on the lander paired with a copilot on the *Bradbury*, so they could share both views of the Martian approach. Carver hung from straps in the pilot pod, while Max did

the same up in the ship; but though they used the same piloting gear, there was one key difference, an old bacon-and-eggs joke: The chicken is *involved* in breakfast, but the pig is *committed.* Carver played pig in the frying pan, and Maxwell was the chicken, wondering if we would fry.

Commander Cooper's First team had devised this system to rescue Desney, his second-in-command, after she had violated mission rules and landed on Mars. They were supposed to teleoperate robots on the surface, preparing for future manned landings but with none approved for their mission; but the splintered crews on the First schemed to land on their own, all chasing national prestige and influence. Desney finally pulled it off, but she crashed in the landing. After Cooper united his crew to rescue her, the floodgates opened. They rewrote their mission plan, with multiple surface excursions and piles of samples and data returned.

The rumble outside continued. On Earth, wind whistles, but on Mars, the thin air only propagates long sound waves, and they don't travel far. The deep sounds of wind were peaceful to terrestrial ears, but that was a deception. They could turn deadly in moments.

"All right there, Ensign Smith?" Lieutenant Gale called across the cabin.

"All right, Lieutenant." I appreciated the concern, but not the tone: *Poor girl, can you handle this stress?* The whole flight, the British officer had been concerned with my welfare, and also with getting me into his bunk. *Hah!* If I were going to turn to men, it wouldn't be for a snake like Horace Gale. He was a phony, a whole different person with the officers than with the enlisted. The Initiative chose him, and Captain Aames didn't wash him out, so I trusted him. I even liked him, after a fashion: We were chosen for compatibility on a long mission, so even an asshole like Gale had good points. But I didn't like him *too* far.

I smiled back at Shannon Lopez behind me, and she grinned. She had rebuffed Gale as well, and we had joked about it on occasions. Of course, she had rebuffed me, too. If she was involved with anyone, she was pretty discreet about it.

I rubbed my shoulder where the straps had caught me. There would be a bruise there, but it couldn't wipe the grin from my face. We might die at any second, but I simply couldn't believe it. After years of training and travel, *I was going to land on Mars, just like the First!*

I had watched reports from the First crew on the big screen in the Old Town. I had to know *everything* about them. The public on Earth and Luna couldn't get enough of those brave explorers who conquered another planet. But it was a lousy career move. Behind the scenes there were shakeups across the national agencies. When those settled down, the administrators decided that the mission hadn't been international enough. They formed the new System Initiative to manage joint exploration, and the Initiative hired a whole new crew.

The captain said, "Max, hold off on that clear pocket. We may need it for Lander 1. Weaver says that may be our only solution, and we don't want you getting too close." There were six of us on each lander, the ground teams who would gather data, run experiments, and build facilities on Mars. *(On Mars!* I still got a thrill from that.) Max, Weaver, Koertig, and Uribe remained on the *Bradbury,* running experiments, tending the hydroponics, and maintaining contact with Mission Control.

"Captain," Carver answered, "A's followed by two more. We can go with B or C, but C's moving slower." There was an implied question there, a lift in Carver's voice. *Bad mistake, Carver,* I thought, *never hesitate with him.* With Captain Aames, it's okay to not know, but say so!

The captain pounced. "Choose one, Carver! I'm busy. Max said you were a pilot, was he wrong?"

"No, sir!" Carver was smart enough not to argue, just go back to his piloting.

The First *Bradbury* Expedition was a dead end for its crew. They're celebrities and heroes, but unofficially, they're blackballed. None has ever served on an Initiative mission. The only work they can find is with transport companies and other private ventures. For the Second *Bradbury* Expedition, the Initiative didn't want Mars experts; they wanted discipline and loyalty to the mission. We would follow the rules, and they would teach us what we needed to know about Mars. So none of us had any real experience with Mars landings.

Max came back on the comm. "Deece advises we go for C, Lieutenant." Decision Consultant,

or Deece, was the expedition's AI. She ran simulations and models to advise us on our decisions. "We'll need to boost to hit it without getting sucked into A." I felt a push from behind as Carver applied thrust from the main engine.

"Keep an eye on that storm," the captain said.

Gale cut in. "Deece's model says it'll miss us."

"It's not the model I'm worried about, Horace." The captain used Gale's first name any time the Lieutenant annoyed him—which was often. "The real storm's not following the model. It's already in Coprates quadrangle. It could turn our way at any time." Our landing strips were in the heart of Coprates, in a fairly even stretch of Solis Planum. If the storm was in the quadrangle, Aames was smart to be concerned.

The Initiative wanted a commander who wouldn't embarrass them again, so they had selected Captain Nick Aames. That was a gamble: He has a stubborn streak, and contempt for *stupid* rules if they endanger the mission; but he respects safety rules, established procedures, and chain of command as long as they serve the mission. His successful missions outnumbered his clashes with command, but it was close.

And he likes discipline to keep focus. He rode us until we knew our own specialties *and* had cross-trained in at least two others. He inspected every bolt in the ship, monthly, plus surprise inspections when he thought we were slacking off. His ass-chewing skills are legendary, and we learned to avoid them.

If he went too far, we turned to Chief Maxwell. Max had served with Aames on three missions before Mars. They understood each other. If you took a beef to Max, he made you see it the captain's way, so the reprimand didn't sting so much. If Max decided you were right, he could intercede with the captain. Sometimes. He had for Carver, convincing Captain Aames that the young programmer should cross-train as a pilot.

Suddenly the lander flipped up on its side. I hoped Max knew what he was doing. Otherwise Carver, Gale, our shipmates, and I would be spread across the Mars-scape. But before I could worry, the lander dropped rapidly and slid back to a level altitude, and the ride was smooth as a parking orbit. "Nicely done, Lieutenant," Max said.

"Thanks, Chief. I think we have clear air from here."

"This is Mars, lad. Never assume." But Carver had it right: With Maxwell's assistance, we rode that pocket down to landing altitudes. It was still a wild ride—not my wildest ever, someday I'll tell you about a bull riding contest outside São Paulo—and the rumble never stopped; but Carver had it under control. Soon the red hills of Mars were everywhere outside the ports, and Max reported on the comm: "Beacons show Landing Strip A is three degrees starboard. Adjusting course." The robots from First had constructed strips and ground facilities. Those were obscured by the blowing sands of Mars, but radar and radio beacons guided us down.

The captain said, "Lander 2, we caught an unexpected updraft. We'll miss Strip B, and radar shows soft ground off the edge. I'm boosting out of this approach, and we'll circle around for another try. Looks like you'll beat us down. Weather permitting, we'll rendezvous at your position."

Max answered, "You have enough fuel for another pass, captain?"

"If I didn't, I wouldn't be making the pass." Even Max wasn't immune to the famous Aames scorn.

"Chief!" Carver cut in. "I'm taking us down."

"All green from here," Max answered. "Seal helmets." I dropped my faceplate and latched it into place. It would suck to survive a crash only to asphyxiate on Mars, so we landed with our suits sealed.

The helmet dulled the sound from outside, so I tapped on the external microphone. Then I heard high-pitched white noise as the flaps tore through the thin atmosphere. Next came clunking beneath us as landing gear dropped into place. Carver and Max called readings and adjustments back and forth as we swiftly descended to the red planet. Looking around Carver, I could see Lander Complex A out the front window: a landing strip, an automated propellant factory, a crawler garage, and some smaller structures. These had been constructed by the robots of the

First expedition. Then after Masha Desney broke protocol and landed right where we would land, the First crew did a lot of the work themselves.

We continued our powered glide to the strip. There was brief panic as the port wing dropped, a jolt of adrenaline as Max compensated, and suddenly I felt three swift jolts as the lander touched down, bounced twice, and settled onto the runway. The lander filled with cheers as we sped down the concrete, brakes humming and flaps screaming. Max came on the comm: "Ladies and gentlemen, welcome to Mars!"

The captain's voice cut through the cheers. "Good flying, Lieutenant." I saw a wide grin on Carver's face, all white teeth, looking as if his face might split. A word of praise from Captain Aames was a rare treasure. But as quick as that, the moment was past, and the captain pushed again. "Gale, get your people unstrapped and out. I want that lander anchored down. I don't like the long-range Doppler readings."

"Yes, captain." Gale reached for his strap.

A female voice cut in, steady and warm: "Do not unstrap. Model analysis in progress. Do not unstrap."

"Yes, Deece." Gale relaxed back into his seat. "Everyone remain seated." D.C. was another consequence of the First expedition. The Initiative wanted oversight on every decision, but they couldn't do that effectively with a twenty-plus-minute light speed delay. So they installed a high end Artificial Intelligence to do their overseeing. Deece monitored every action, fed it into her scenario model, and advised us whether it complied with the latest mission protocols; but she blurred the line between "advise" and "command." We resented her (well, maybe not Gale, the suck-up), but we were stuck with her.

Not that I have anything against AIs. I've met some great ones back in Tycho, programmed by real pros; but they're not *human,* and no amount of programming will change that. They don't see things the way a human would. And Deece's programmers *weren't* real pros, if you ask me. She was a pain in the ass: too limited, unable to adapt to changes outside her training.

The captain was no happier than I was. "Damn it, Deece, that front could turn this way and toss that lander halfway to Valles Marineris!" Any lander light enough and with enough lift to land on Mars was light enough for a storm to carry it away. The runway had anchor pits where we could drive the lander in, anchor it down, and close the hatches.

Deece was unflappable as only an AI can get. "I have updated weather models from D.C., Captain. They show no immediate danger. Initiative protocols say the crew must remain ready for immediate liftoff in case of an unforeseen threat. I advise the crew to remain strapped in."

Deece's plan made sense, according to her protocols. Taking off from Mars is easier than landing. To take off, you just have to miss the ground, and keep missing no matter what the winds do. But to *land,* you have to miss it just barely; and then barely miss again and again until you hit on your terms, not Mars's. With solid boosters, we could lift clear of the worst storms in under a minute, even in bad weather.

But Aames had no intention of running from Mars without a fight. "Fine, stay strapped for now. Carver, drive that bird to the anchor pit. Let's not waste any time. Now I have my own landing, so stop chattering in my ear!"

The lander started taxiing. We were downstrip from the anchor pits, so Carver had to find a turnaround. The landing strips were half buried, so he had to navigate by pattern recognizers and deep radar. If it weren't for Deece, we could've hoofed it over and prepared the pit. Instead we waited.

Carver was just pulling into the turnaround when Aames announced: "Lander 1 down on Strip B and heading for the anchor pit."

Deece chose that moment to add: "Model suggests no urgent threats that would require immediate liftoff. Recommend crew prepare to anchor Lander 2."

"We would've never figured that out, Deece." The captain's sarcasm was wasted on the AI. "Max, take the taxi. Carver, unstrap and be ready. That storm front's picking up speed. I want all hands prepping the anchor pit."

"Yes, Captain," Gale said. He unstrapped and crouched near the floor hatch. "All hands, get

ready and strap on your toolkits. Don't waste a minute when we reach the pit."

So there was a lack of ceremony when I set foot on the Red Planet: Gale opened the hatch as Max coasted to a stop, and one by one we dropped down to the runway. It was a slow drop, thanks to Mars's low gravity. I had a moment to savor the feeling: *I'm on Mars! Right where Masha took her first step!* Then I bounced out of the way of the next spacer, just like in training.

In the open air of Mars, I heard yet another rumble, this time from wind scraping past my body suit and my helmet. Our leggings and sleeves were soft, pressurized tubes with gasket-fitted joints; but the body suits were hard, fitted shells, and the helmets were hard polymer bubbles. Both were good protection against hazards, but noisy as hell in that wind.

I weaved in the first real gravity I had experienced in months. The mactory deck of the *Bradbury* spun for low centrifugal gravity, and we exercised there daily; but weak as Mars's gravity was, it was double what I had gotten used to. I leaned against the lander's leg as I looked around to orient myself. Just east of the strip was the propellant factory, an egg-like dome that ran on wind and solar as it mined the Martian surface for perchlorates and other compounds that it shaped into propellant disks. These could be loaded into our booster tubes to help us escape Mars. On the other side was the crawler garage, and beside it an access turret concealed stairs down into the anchor pit. Between the garage and the factory were the two metal plates of the pit hatches.

Gale was already working on the latch. He ran a blower, clearing the hatches of sand, and I crouched to unhook the latch. The hatches were designed to open easily from above: two large metal covers on hinges, locked together by a circular compression latch. We had to unhook the pair of meter-long latch handles, lift them, and use them to turn the latch plate. Then we could lift the plates, and the lander could roll down the ramp and into the pit.

I unhooked the handles easily; but when I tried to pull the first one up, it wouldn't budge more than half a centimeter. I tried the second handle: same thing. "Lieutenant, there's sand in the shafts. They're stuck."

Gale nodded. "Cooper, van der Ven, Pagnotto, help her out." My shipmates joined me, two on each handle. Elvio Pagnotto and I pried for all we were worth. Months in low G hadn't weakened us, thanks to a ruthless exercise regimen, but raw strength wasn't cutting it. I pulled with my arms and pushed with my legs.

Suddenly my grip slipped, and my leg strength threw me violently into the Martian air. The sky and the horizon spun crazily as I rose and fell, and I noticed more sand whipping by, moving faster. I wondered if I would damage anything when I crashed.

Fortunately Carver was on the ball. He loped after me, caught me, and set me down. "You all right, ensign?"

I smiled through my visor. "Except for my dignity. Lieutenant Gale, they're stuck tight."

Aames came on the line. "The latches are fine here. You'll have to clear the housing from underneath. Move, people, move! That front is picking up speed!"

"The models—"

Aames shouted, "Screw the models, Horace! Look at the horizon!" I looked and saw a growing cloud of sand. "Move!"

Carver and I set to work on the access turret. The door was blocked by sand, but we pried it open. The space inside was five meters across, with the east half open into a shaft with a circular staircase made of tall steps—almost a ladder on Earth, with just a thin handrail. But on Mars, the steps were easy to descend, even with a suit, an environment pack, and tool kits. At the bottom was an open pressure door leading to a short, wide tunnel ending in another open door. The tunnel doubled as an airlock, but the doors had been left open, since neither end was under pressure.

Beyond lay the pit. Light panels in the ceiling automatically came on, showing us the artificial cavern with its ramp to the surface at the far east end.

"At least the solwind worked," Carver said.

"Uh-huh," I said. The panels, powered by a solar-wind generator station on the surface,

illuminated the entire pit. A mechanical lift beside the ramp would let us reach the hatches. Supply cabinets lined the walls. A pressure door on the far side led to a shelter.

Immediately we saw another problem: the pit was ankle-deep in sand. "Lieutenant," Carver called up, "the seals have failed. There's a lot of sand down here. That's probably how it got into the housings."

"Can we get the lander down?"

"Yes, Lieutenant, but it'll be messy."

"Messy we can handle. Get to work."

Trudging through the loose sand, we set to work on the hatches. The lift worked, raising us above the ramp and extending out so we stood under the hatches. Everything looked different from underneath, but Aames had drilled us on all of the First's equipment. We knew how this system worked.

The handles below were much like the handles above, so Carver and I pushed while Van and Pagnotto pulled. No go. We had to clean and lube the shaft housings. Looking at them, I knew that would be impossible as they stood. "Lieutenant, push 'em down. We can't fix them like this."

So we changed direction, Van and Pagnotto pushing while Carver and I pulled. We had to hook our boots into the lift rails to avoid doing pull-ups in 0.38 g. We were panting and sweating, but we pulled the first handle down. We pulled the shafts apart, cleaned them, and applied lubricant from our toolkits. Then we put them back together, and Carver called up, "Handle one is done. Moving on to two."

Aames answered, "No time! Gale, get your team down into that pit. Now!"

Deece's soothing voice responded. "My model shows the storm strength will not reach the danger point for ten-point-three minutes."

"Your model is wrong! Move!"

"Yes, Captain!" Gale answered. We saw light as the turret door opened and our shipmates scurried down amid billowing clouds of sand.

Gale was last into the turret, pulling the door shut behind him. The wind outside, though, grew louder than ever. Gale shouted over the noise. "Bloody hell, Carver, you weren't kidding! There's sand everywhere. Everyone look around, find that bad seal!"

We searched the pit, but we found nothing. Carver and I checked the hatch seals, and I heard clanking outside, low and loud like heavy metal boots stamping on a bass drum over and over. "What the hell's that?"

Carver listened. "The landing gear shocks, bouncing up and down. Wind's picking up."

Shannon checked the turret. "Here it is, Lieutenant." Gale climbed up to join her. Van and Pagnotto looked up from below. "It looks like something cracked the join between the carbon panels."

Gale looked at the join. "There's a quarter centimeter gap here. Good job, Lopez. Get some seal tape on that. When the storm passes, we'll reweld that seal." Gale came back down the steps.

Carver called across the pit. "Lieutenant, the lander's bouncing. It won't stay down long."

"Damn! Deece, can you launch the lander, get it away from the storm?"

"Analyzing." Deece paused. "There is time to boost above the front, but we would have to refuel at the orbiter."

Aames broke in. "Gale, that model's wrong. Look at the wind readings from the lander."

Gale checked his comm. "Captain, they're high, but in the safety margin. If we wait, they won't be, and we'll be down a lander. Deece, boost."

"Gale!" the captain shouted. "Look at those winds! It'll push—"

But his warning was lost in the subsonic rumble of the solid rocket boosters igniting. The hatch plates rattled, and I was glad the lander wasn't any closer.

Carver looked at his own comm, and his eyes grew wide. He shouted something, but it was buried by the engines and the rattling hatches. Frantic, Carver pushed a warning to my heads-up display: GET UNDER LIFT! EXPLOSION! He scrambled for the edge. I leaped after him, and

I saw that Gale and the rest were diving for cover as well.

The engine rumble had diminished, surely a sign that the lander was boosting skyward. I rolled up in a crouch just in time to see Shannon bolting down the stairs.

Then a much louder sound wave shook the entire pit, an explosion that deafened us. The ground shook, ceiling panels fell, and the turret collapsed upon Lopez. I tried to run to her, but Carver held me back. Then the ceiling fell in, and the lift dropped on us, and everything went dark.

And then I died in the mess.

* * *

## 2. Ground Control

Well, obviously not, but it *felt* like I died: a crushing pain in my side, everything went dark all at once, and I went unconscious from the shock. I *could've* died in the mess, and I was the lucky one. Shannon was killed instantly. Fadila van der Ven's left leg was caught in the lift mechanism and crushed. His auto-tourniquet kicked in, but the leg was already a lost cause from the knee down.

I knew none of that at the time, though. The first I knew was a voice on my comm. "Smith. Smith, what's your status?"

It took a moment to clear the fog from my brain. "Captain?"

"Report, Smith. Your suit shows you're injured, but not critical. Can you move?"

I flexed my legs and arms, but the lift pinned me, and the effort made my left ribs spasm in pain. Something around my legs and arms kept me immobile. Sand?

But I didn't need to move, the suit was on voice control. "Suit, lights." Nothing. "Suit, *lights."* Still complete darkness. "Lights, damn it!" I started breathing rapidly.

Aames kept his voice steady. "Calm down, Smith. Your comp says your lights are on." As captain, Aames had a diagnostic circuit for each of our suits. "You can't see them because you're buried in sand. Now report: *can you move?"*

I slowed my breathing, trying to dispel my panic. Gingerly I tried my right arm. It was stuck between sand and the lift, but I could wiggle it back and forth. Maybe if I pushed enough . . . *"Ow!* Sorry, captain. I'm trapped under the lift, and my ribs are sore. But if I take it easy, maybe I can dig out."

"I'm sure you can, Smith, but be careful." Aames sounded almost empathetic. "Your suit says those ribs are bruised, but suit comps can't always diagnose breaks. Your seals are intact, you've got air, so take it slowly. Carver and Gale have dug free, they'll get to you soon enough. There are others in front of you."

"Others?"

As I dug, the captain told me about the others: van der Ven and his leg; Pagnotto, who had managed to get a concussion in a helmet; and poor Shannon. She had been a good friend, and I cried, but not so as Aames could hear me. He wanted me to be strong, and I didn't want to let him down.

Then he made me feel even worse. "They can dig you out, but first . . . they have to amputate van der Ven's leg."

Then the sobs came, despite my efforts to control them; but I didn't have time to cry, so I kept digging. I changed the subject. "I see light, captain."

Then Pagnotto's voice cut in. "Smith, I see movement. Is that you?"

"Elvio, yes, I'm almost out." Sand slid from my visor, and I saw the wreck that had been the anchor pit. The surface hatches were intact, but dozens of ceiling and wall tiles had fallen all around. A few of them hung down, swaying in a breeze. Damn! That meant a much bigger leak. Sand swirled around in occasional eddies.

Most of the light panels were out, and the tiles and sand cast shifting shadows. I saw Elvio on a wide bench folded out from the wall, waving to me. He pushed up with one arm and wobbled to his feet. "Wait, Smith. I shall come help."

"Negative," Aames ordered. "Pagnotto, you're not even supposed to be sitting. Rest, and that's an order."

*"Si,* captain." Pagnotto collapsed to the bench in the low gravity and laid sideways. I couldn't see Shannon's body anywhere around.

"What happened, Captain?" I asked.

Aames snorted. "It was that damned AI."

"Captain!" I whispered. Some people think AIs have feelings, but they don't. I wasn't worried about "offending" Deece. But she represented the Initiative planners here on Mars. Criticizing her felt like insubordination.

"She can't hear, I cut her out of the ground loops." Now *that* was insubordination! "Her models from D.C. Command are getting unreliable. Her programming is fine, but her premises are flawed. The winds were stronger than she accounted for. When the lander took off, the storm shoved it east. Right over the propellant factory."

I stopped, stunned, my arms and head just clear of the sand. "Oh, fuuuuuck . . ."

"The entire propellant store went up. The factory's a total loss."

That explained the collapse. The automated factory had enough stored propellant for twelve trips. A lander *could* get to orbit again without refueling but only if the weather was ideal.

I needed to do *something,* so I resumed digging as I asked, "Lander 2 was lost?"

"Negative. As big as the blast was, the lander boosted faster. She was rocked, but she kept going."

"Any damage?"

"We can't tell. The trajectory's unsteady. Maxwell and I are tracking her approach to the *Bradbury.* The team can check her when she docks."

I swallowed. My throat was dry. I found my straw, bit the end to open the bite valve, and sucked, but I got nothing. "Damn."

"Problem, Smith?"

"No water, Captain. My drink bag should have plenty of water."

"It shows empty on your readouts. Must've burst. Now leave me alone, ensign, I have to follow this approach."

I needed a distraction. "Can I listen in, Captain?"

The captain hesitated. "All right. But don't chatter in my ear! I've got to keep an eye on Deece."

He cut me into the command loop, and I heard Max arguing with the AI. "—too wide, Deece. Weaver, got those cabins sealed yet? We may have a collision. Deece, boost higher!"

Deece's calm contrasted with Max's tension. "Models indicate approach vector is within acceptable parameters."

Aames cut in. "Damn it, Deece, boost already."

"Yes, Captain. Boosting."

I couldn't see the approach readouts, but Max and the captain could. Max responded. "Too late, Deece, you're too fast. Abort."

"Models indicate—"

Max shouted, "Abort! Captain, request control."

"Deece, turn control over to Chief Maxwell."

Deece's calm response gave me a chill. "I cannot do that, Captain."

Max's said, "Definitely too fast, Captain!"

Aames's voice was coldly precise. "Deece, that's an order."

Deece replied, "Captain, you are under stress due to the trapped crew. Chief Maxwell is also under emotional stress. Psychological models indicate that your judgment is compromised. I am most competent to make this approach."

"This is Captain Nicolau Aames. Override sequence one code one one A. Transfer control!"

"Got it, Captain," Max said. "All hands, brace for impact! Trying to pull out. Thirty meters, seven mips . . . Twenty, six-point-three . . . Ten, six-point-oh . . . Five . . ."

A horrible feedback squeal came over the comm, and then silence. I held my breath, stunned.

But then static filled my ears before going down without going away. Through the static, Aames called, "Max . . . Max, respond . . . Max, Weaver . . . *Bradbury,* this is Aames, anyone

respond."

But there was only more static.

I dug out enough sand that I was suddenly free, sliding on my belly slowly to the floor. I lightly rose to my feet and inspected my suit for scrapes, tears, or other damage. Eventually the captain stopped calling, and the static was quiet enough that I could hear Pagnotto moaning on the local channel. Many tiles had fallen, while one swung loosely from the ceiling. I stepped carefully in the piles of sand: I felt debris beneath my boots, chunks of tile and loose parts, large enough to trip me if I stepped wrong. I reached Elvio and checked his suit diagnostics. "Captain, why's the comm so staticky?"

"Think, Smith, check your band. Your comm automatically switched from SHF relay off the *Bradbury* to low frequency ground wave."

"But that would mean . . . Sir, it's antenna failure, it has to be. Six mips isn't *that* fast."

"Maybe." But the captain sounded doubtful. "It depends on where Lander 2 hit. My last reading before the comms cut off was an emergency alert from engineering, a fragment of a data packet. My suit computer is trying to reconstruct . . ."

Aames fell silent, and I let him work while I saw to Pagnotto. Judging by Elvio's suit readings, he was conscious, but his eyes were closed. "How ya doing, Elvio?"

His eyes flickered open, but he had trouble focusing through his visor. "I have felt better, Ensign. My head aches, my neck throbs, and a thousand pins stab my feet. And also . . . *vomito."*

I checked Elvio's vomit bag. It was half-full, but I also saw some around his mouth and neck. "You look like I did after that pub-crawl in Munich. Why aren't you in the shelter? We could get your helmet off and clean you up."

But my attempt to lighten his mood was a misfire. "I do not wish to see . . . surgery."

Of course. Gale and Carver were in the shelter, amputating van der Ven's leg. I silently agreed: we could wait outside a while. I dug further into Elvio's diagnostics: concussion, cervical acceleration-deceleration, but no signs of hematoma. That last was a small comfort: I didn't relish the idea of catheterizing his brain. He tried to bear up under the pain, but he still moaned repeatedly.

The comp recommended sedation and rest, but emergency protocols had kicked in. An injured crewman might still do vital work, while an unconscious crewman was just one more problem. So the comp flashed a question: SEDATE? YES OR NO.

I tapped YES and then watched Elvio quickly slide into sleep. I welcomed the silence as his moans subsided.

Over the comm, the captain whispered a single curse in Portuguese: *"Porra . . ."*

If Aames was shaken, I was scared. "What's the matter, Captain?"

"That packet was an alert from the reactor system. Cooling offline, and temperature already in the red. Indicators of a critical failure in progress."

"Critical? That fast?"

"Explosion, decompression, maybe other failures as well. We can't know, but the *Bradbury* is offline."

"But our food . . . Our . . . tools . . ."

"No need to do an inventory, Smith. The bulk of our consumables were up there."

I swallowed, my dry throat painful. "Then we're . . . dead."

"You're a mighty talkative corpse," he replied.

I couldn't believe his scorn in this situation. "It's only a matter of time!" I couldn't keep a half-sob from creeping into my voice.

"You don't know that, Ensign!" His tone changed. I had only heard that a handful of times in all the time I had known him: He was trying to be comforting, in his awkward way. "I've seen you in bad times, Smitty: bar fights, rescues, battles with incompetent officers. I have seldom seen you lose, and I have *never* seen you give up without a fight. Am I wrong?"

I tried to steady my voice. "No, sir."

"Of course not. I count on you for that. We're still alive. Our best chance to stay that way is to keep our heads together. We need all of us with our heads in the game. Panic now *will* kill us."

A little stronger, I answered: "Yes, sir."

"This isn't a hopeless situation, Ensign. That new Holmes prototype, the *Collins,* is due to orbit Mars in eight months. If we hold out, we can catch a ride home."

"At their approach speed? They'll be almost impossible to catch!"

Aames sounded indignant. "Are you questioning my piloting skills?"

"No, sir." But I had doubts, whether I said them out loud or not. The *Collins* was on a cycler orbit, with a series of high-speed loop-arounds planned to send her back to Earth. We would need a perfectly timed orbit to intersect her course.

"Good. Trust me, we'll make rendezvous, but only if we last that long."

"But eight months, captain? Without the *Bradbury?"*

"We don't know that. Plus we have survival resources in the anchor pits. We need to know how much if we're going to make a plan. Do a complete inventory, and don't overlook *anything.* I'm going to send you an annotated manifest with the items we *must* have. I don't care how much you have to dig, but find those items! Then find anything else you can. We have to stretch our resources farther than they were ever intended, so we don't know what could prove useful. When you have that done, report back to me."

"To you, sir? Not Lieutenant Gale?"

"Inform Gale, of course. But inform me first."

"Yes, sir."

Again he turned confidential. "I need you to keep an eye on things, Smith; van der Ven's out, and Pagnotto's concussed. I can't tell what's up with Carver, but he's awfully quiet. And Horace . . ."

Gale had always had trouble with Captain Aames. He always looked for the easy, fast answer. Gale had powerful friends in the Initiative, so the captain was stuck with him for political reasons, but we all knew there was friction there. "I know, sir."

"I'm not sure you do, Smith. This is more than just his usual attitude. Gale's a nervous wreck from the surgery. It's one thing to do virtual medical training, it's another to saw off your friend's leg without even a doctor to supervise, so cut him some slack. But that means you're the only one I can count on to hold it together there. If trouble comes down, I trust you to handle it. Don't let rank slow you down."

I tried to smile. "Have I ever, Captain?"

"That's the spirit, Smith! I knew I could count on you. Now get to work! For the next eight months, there's no such thing as spare time. We'll have to use every second to stay alive."

"Yes, Captain."

"Now get to work, Ensign." The comm went silent, and I had a brief shudder of *aloneness.* Elvio was with me, Gale and Carver and Van were just beyond a pressure door, and Captain Aames was only a comm call away; but there in the darkness, buried beneath the surface of Mars and doubting we would live, I felt alone, cut off from humanity. I'm not proud to say it, but I collapsed to the floor and sobbed in my helmet.

After a while, I found myself staring at the shifting shadows from the swinging light panel. I had no idea how long I had sat there. Damn! *We'll have to use every second to stay alive,* the captain had said, and I was wasting time basting in self-pity. If Aames had been there, he would've kicked my ass for sure.

Well, the captain wasn't there, so I would have to kick my own ass. "Take an inventory?" I said to the silent comm. "Yes, sir!" I pushed myself up from the floor—wincing a little at the pain in my left ribs—and began searching the anchor pit. This wouldn't be easy, with all the devastation in the pit, but I appreciated a challenge to keep me busy.

I found a shovel and a makeshift sifter: I dumped piles of sand onto a ceiling tile and then gently brushed it off, looking for buried treasure. I used my computer to keep a verbal inventory. I had confirmed that my water bag had burst. Most of my drinking water was now soaked into my skivvies, mixing with sweat. Eventually I could reclaim it if there was a working cycler in the shelter; but until then, the work was getting me mighty thirsty.

I saw that most of the wall cabinets were sealed, so I assumed their contents were intact. My

heads-up display showed the captain's manifest, as well as a map that overlay the scene in front of me, highlighting where to find stuff. There was a lot we could use in there: spare lander parts, food concentrates, electronics. . . . There were even spare air bottles, filled by a catalytic compressor that extracted oxides from the soil. I checked my own $O_2$ levels and Elvio's: both were low, so I swapped in bottles from the compressor.

Then I checked the manifest. *Yes!* Water bags, also from the compressor. I swapped one into my environment pack and sucked on my straw. Water at last! It had a high mineral content and a definite tang of iron. "Martian Springs," the First expedition had dubbed it, but I didn't care: It was the sweetest thing I had ever tasted. I bit the valve and sucked as fast as I could. Even as I did, I felt dampness spreading through my skivvies, but I didn't care. Hydration did wonders for my spirits.

Aames was right: We were a bunch of smart engineers and survivors. We could do wonders with these resources if we didn't panic. I noted which cabinets were still sealed, and I updated my inventory.

I concentrated on digging and sifting. It felt good to occupy my mind and give me tiny reasons to hope. Every discovery made me think: *How can this help us survive?* Could those nuts and bolts help us to seal the anchor pit and build a better shelter? Could those wires help us build a radio that could reach the *Collins?* Every discovery was ripe with possibilities, and those kept me working—those, plus my determination not to disappoint Captain Aames.

The door to the shelter opened, and Carver and Gale came out in their suits. Gale helped Pagnotto into the shelter. Carver looked at what I was doing, and without a word, he started sifting the sand along the far wall.

We worked for two hours that way. I tried making small talk, but Carver was having none of it. I caught his face through his visor, and his eyes looked hollow. The captain was right: This situation was dragging Carver down to a very dark place. That wasn't good for him, or for the rest of us, either. Despair could turn contagious. I tried to get him to open up, but I had no luck.

Slowly our inventory lined up with the manifest. A few small parts remained lost in the sand, but if there was anything critical buried there, we would find it when we needed it.

As Carver continued sifting, I turned to the access turret. Carver and Gale had cleaned out enough debris to recover Shannon's body, but the shaft was still filled with collapsed tiles and the wrecked stairs. Fragments of the roof lay beside the shaft, including one large bloodstained chunk. I found shards of Shannon's helmet. Our helmets are light but incredibly strong. A normal impact couldn't shatter them, but they weren't designed to survive a falling roof.

As I stacked the wreckage, I saw the source of the wind and sand. Amid the debris in the shaft, there were large gaps, and my lights showed constant swirls of red Martian dust. The surface turret was *gone,* swept away by the explosion. Nearly three hours later, the storm still blew. The pit was sealed, but wind and dust found their way down the shaft.

If we could clear the shaft, there was a secondary hatch we could seal against the storm. I pitched more debris into the pit. The ache in my ribs returned. The inner arc of the stairs was supported by a metal rail, parallel to the guardrail like a DNA model with thin posts joining the rails. The rails were twisted out of shape, tangled and knotted in the shaft. Before I could climb to the top, I had to clear a path, using a wrench to disconnect the stairs (carefully counting and pocketing the bolts) so that I could pull the rails apart.

I worked as high as I could reach, but the stairs climbed three stories. There was a ladder set into the far wall of the shaft, so I climbed that as far as the wreckage allowed. Then I used tethers and carabiners to attach myself to the ladder so I could clear more debris. It was awkward at first, with my feet planted on a rung as I leaned out on my tether, but I adjusted quickly. That was my undoing: I got cocky, and I misjudged my ability to dodge falling debris. When I freed up one stair, the entire rail structure shifted. A ceiling tile came loose, smacked me in the back of my helmet, and dazed me. I fell free, tethers pulling me back so I crashed against the wall. The air was slammed out of me, my ribs stabbed with pain, and I banged my head on the cushioned rear of my helmet.

I hung onto the side of the shaft, blinking, unable to think clearly. Then a voice cut through

my fog: "You okay up there, Smitty?" Carver stood at the bottom of the shaft, looking up at me.

I shook my head. *Ow!* That was a mistake. "Just stupid. Not watching what I'm doing." Then I had an idea: Carver was talking, so I would try to keep him that way. "Lieutenant, help me out here?"

"Sure, Ensign." His voice lacked enthusiasm, but I'd take small steps. "You need me up there?"

"No, I'll drop stuff, and you toss it out, keep the shaft clear. And be the eyes in the back of my head. Watch for things that might fall."

"I can do that." Carver backed out to the edge of the shaft. "I've adjusted the zoom on my helmet camera and patched in a motion sensing algorithm. If anything wiggles up there, we'll know."

"Good idea, Carver. What would we do without your computer smarts?"

"Yeah." He spoke so softly I could barely hear him. The brief lift in his mood left, and he fell back into darkness. All because I had mentioned computers. . . .

Of course! Carver was the chief programmer; and Deece, the chief program, had failed us. Carver blamed himself: for the failure of the mission, for Van's leg . . . for Shannon.

I found a rung with my feet. Then I felt back with my right arm—I tried to use my left, but my ribs said *No*—until I found another rung. I pulled myself back up, got my balance, and went back to work.

I decided to do a little direct intervention with Carver. Never tiptoe when you can charge in! I needed him to focus, so I "accidentally" dropped a bolt. "Heads up!" I watched the bolt slowly accelerate, leaving him plenty of time to pick it up on his motion sensor.

Carver stretched out one gloved hand, and the bolt fell neatly in his palm, his fingers wrapping around it. "Got it!"

I grinned. "Make sure you count that, Lieutenant."

"One bolt," he answered, "one centimeter, slightly stripped." Then his voice took a lighter tone. "Apparently coated with butter."

"Sorry, Lieutenant." But I wasn't. I had him talking again. "We all make mistakes, huh?"

He shook his head. "There's mistakes, and there's . . ."

I wouldn't let up now. "Look, Lieutenant, things are bad here. Don't make them worse by blaming yourself." Carver grunted, so I kept going. "We don't know what went wrong. I've worked with Captain Aames on after-action reports, and it's *never* just one thing. We would catch anything that big. It's always a dozen things that were *almost* perfect, but tiny imperfections stack up."

"But it was *my* 'tiny imperfection'!"

"We don't know that! And right now, I don't give a damn. I only care about surviving the next few hours until Captain Aames comes up with a plan to get us through the next few days, and then the next few weeks!"

Carver was getting irritated. "What plan's he going to come up with, Smith?"

"I don't know. He's the captain; I'm just a noncom. But he *will* come up with one, and it'll depend on all of us keeping our heads in the game. We have to rely on each other to get through this, all of us. Including you, Lieutenant."

I wasn't intentionally echoing the captain. He has a way of influencing you, hammering and pushing you until you see things his way.

But Carver was slipping away again. "I don't see what good any of this is going to do us. Nuts? Bolts? Gaskets? They're not going to change anything. Don't you understand, Smith? I've *killed* us!"

Before I could answer, Aames cut in. I had never closed my channel to him. "If you can whine, you're not dead yet, Lieutenant. Neither are the rest of us, and we're not giving up. You will *not* let us down, and that's an order! Understood?"

Carver sounded sullen. "Understood. Sir."

"Knock off the attitude, Carver. Now! We don't need you blaming yourself and marinating in self-pity when there's work to be done. If you want to have a breakdown, wait until you get

back to Earth!"

"Yes, sir!"

"Lieutenant, understand this: I don't give a damn about who's to blame for this mess, I only care about who's going to get us out. Are you on the solution team?"

More firm this time: "Yes, sir!"

"Good. Because if you're not on that team, Ensign Smith has orders to kick your ass until you are. You're third in command on Mars now, Carver, and I need you to act like it. Chief Maxwell put a lot of faith in you, Lieutenant. Don't let him down. Aames out." The captain's channel clicked closed.

I didn't want to push Carver just when the captain had him back on track, so I climbed higher and attached my tethers to the highest rungs. I reached the secondary hatch, but the rails still blocked it. I worked on the top bolts. When I had them half-loosened, I called down. "I have to drop the rails to close the hatch. They're tangled and twisted. Are you ready?"

"Yes, Ensign." His answer sounded neutral: not depressed but without the fire Aames had ignited.

"All right, here's the first one." I released the last bolt on the lower rail. It fell, caught briefly on the upper rail, and then slid lazily free, dropping down to the bottom of the shaft. It landed with a low crash, the sound barely reaching me through the Martian atmosphere.

Carver called up. "All right, let me drag this out."

I set to work on the top rail. Soon I called down: "Top rail coming down!" I released the last bolt and dropped the rail. As the rail fell, I stuck my head up into the ruins of the turret, so I could see how bad it was. To my surprise, the damage was so bad, it was good: The turret had been almost completely swept away. A couple of wall panels had collapsed in a coincidental lean-to that covered the opening; but we would have no trouble escaping the turret.

The secondary hatch was a hinged plate under the west floor of the turret that swung down when I unlatched it. In the Martian gravity, it should've been easy to swing the plate up and latch it in place, but my ribs objected to the twisting, and I dropped the plate before I could latch it. I had to dodge as the plate swung slowly by once, twice—and I caught it. I lifted it into place, latched it closed, and tightened the pressure seal. At last, we were sealed off from the storm. My mouth was dry, and the new water bag was empty. I was ready for the shelter and another drink.

But looking down, I knew water would have to wait. Carver was struggling with the top rail: It was tangled, and the coils wouldn't fit through the tunnel. He tugged and tried to compress it, but it kept hanging up on the tunnel edges. I dropped down to help, and we slid the rail out into the pit.

Carver and I were both puffing. It's never smart to overexert in a suit, so I waved Carver over to sit on a bench. But he refused to sit. He paced, and he stamped, and once he slammed a wall tile.

I checked the captain's circuit to make sure we were alone. Then I asked: "Something wrong, Lieutenant?"

Carver turned away. "He's so rough on me!"

"He's rough on everyone, Lieutenant."

"But he has a target painted on me! During flight training, I did so well with Chief Maxwell. He was patient, he showed me what I needed to do to improve, and he insisted I had what it takes to be a pilot."

I smiled. "Max's a great second-in-command, Lieutenant, he understands his crew perfectly. He said plenty of good things about your flying."

But Carver was still on his rant. "But not Captain Aames! Nothing is *ever* good enough for him. You should've heard him chew me out after my collision!"

I laughed. "Half the ship heard, Carver."

"Yeah, that did wonders for my respect among the crew." I snorted, and he turned to glare at me through the visor. "What?"

"The captain wouldn't waste time chewing you out if you weren't worth it. He'd have kicked

you off this expedition." Carver looked doubtful. "He could've done it, screw mission planning. If he had wanted you gone, you'd be gone. But him and Max, they're a team. They have the same goals, they just go at it from different angles. They want you to be your best." Carver was silent in response. Absorbing or doubting? I couldn't tell. "We need our best from each other right now. You want respect? Straighten up, take your criticism like a grown up, and show that you've learned from it."

"What?"

"Look, Carver. Aames is only as rough on you as you need him to be. You get better, the chewing out will happen less often."

"How good do I have to get so the chewing out stops?"

"Heh. I'll let you know when I get that good."

* * *

### 3. Crawler

We entered the pressure door to the shelter. The airlock is large enough for a rescuer and an injured spacer, and protocol says to pair up when using the lock. The extra person takes up more volume, meaning it takes less air and less energy to pressurize the lock.

Once through the airlock, we entered the dustlock, a futile effort to keep the Martian sand out of the shelter. The iron oxides of Mars aren't as insidious as the fine crushed basalts of Luna, but they still play hell with mechanical and electrical systems. In the dustlock, we vacuumed each other's suits, swabbed them down with electrostatic cloths, and finally vacuumed the floors. Then we stripped to our skivvies: loose white underclothes, mine soaked with sweat and leaked water. My ribs gave another twinge as I unbolted and opened my body suit, but then they suddenly felt better. Examining the inner shell of the body suit, I saw where it had been dented in, right into my ribs. That was where the water line ran through, and the impact had split a valve.

There would be time for suit repair later. We had had a long day already. We hung the suits in a locker next to Pagnotto's suit and Gale's helmet.

Despite all that cleaning, when I padded barefoot into the shelter, I felt the grit of sand beneath my feet. When Gale and Carver had brought van der Ven in for the amputation, they hadn't taken time to unsuit; and since Van's suit had doubled as a tourniquet, they had left it on until they had started the operation. Now his suit lay piled in pieces by the exam table, where Van still lay, unconscious. Gale was also still in his suit as he moved back and forth between Van on the exam table and Elvio on a bunk nearby. He and van der Ven had both cross-trained under Dr. Weaver. It figured one of our field medics would be our first patient.

I looked at Van's medical comp, and then at him. He had lost blood, but the auto-tourniquet had minimized the loss. Gale had given him two units of null plasma, and now he was on a saline drip with painkillers. Gale and Carver had amputated his left leg just below the knee. The stump was wrapped in fresh white bandages. Van dozed fitfully, and Gale had used the restraints to hold him down.

The shelter was only three rooms: a workroom, a utility room to the east, and a bunkroom opposite. None was larger than a large ship's cabin, so we didn't have space for clutter. My ribs weren't so bad now that the body suit wasn't pinching, so I picked up Van's suit as I turned to Gale. "We can watch your patients, Lieutenant, you should unsuit. We need all the elbow room we can get."

"I know what I'm doing, Ensign," Gale snapped. But he headed to the dustlock. By the time I brought the pieces of Van's suit into the lock, his sleeves, body suit, and boots were in the locker, and he was unsealing his leggings. He hadn't vacuumed. I glared at him, pulled the hand vac from its socket, and started vacuuming Van's suit. Gale glared back, hung up his leggings, and went back into the shelter.

I remembered the captain's words: *We need all of us with our heads in the game.... Gale's a nervous wreck from the surgery.... If trouble comes down, I trust you to handle it.* I decided to cut Gale some slack. I finished vacuuming and wiping Van's suit. I also found surgical gloves and biodegradable wipes, and I used those for the grim task of cleaning out the lower

left legging. There wasn't a lot of blood, thanks to the auto-tourniquet, but it was still a mess. Next I started on Gale's suit, which had exterior blood smears along with its coating of dust, and then Pagnotto's.

After the suits, I turned to the dustlock itself, filling the hand vac before I was finished. I swapped a new bag in, returned to the shelter, and vacuumed around the exam table and the bunk. Then I went around the rest of the room, obsessively hunting every grain of sand.

Before I could finish with the sand, I had something else to deal with: blood on the table and the floor . . . and van der Ven's severed lower leg. It lay in a gray plastic tub under the table. Around it was a thin pool of blood, speckled with fragments of bone. I found myself staring at the coarse black hairs on the pale white calf, and at the big hairy foot with its enormous toes. We had kidded Van about his giant Dutch toes. Now I had to . . . dispose of them.

There's a difference between training and doing, but if Gale and Carver could perform the surgery, I could do the cleanup. I took more wipes, swabbed the table and floor, and tossed them in the tub with the leg. Then I applied antiseptic and used more wipes to sanitize the surfaces. When I couldn't avoid it any longer, I took the tub to the utility room, opened the large chute to the nanomolecular composter, and dumped the tub's bloody contents in. Then I wiped the tub clean, applied one more round with antiseptic, tossed in the last wipes, and closed and sealed the chute. The composter's screen lit up, asking me what the remains were. They even provided a helpful dropdown menu, so all I had to do was check "1 HUMAN LEG, PARTIAL,""<1 LITER HUMAN BLOOD," and "BIODEGRADABLE WIPES (WITH ANTISEPTIC)." The composter did the rest, selecting the ideal mix of nanomachines and temperature to break down Fadila van der Ven's lower left leg into component elements and nutrients that we would try to stretch out for the next eight months.

I stopped and thought what I had done. I fumbled open the chute in time to add more organics to the composter. Then I closed the chute again, opened the dropdown menu, and added "<0.5 LITER HUMAN VOMIT" to the list.

After my stomach settled, I stepped away from the composter. I noticed another pile of uniform pieces . . . and a shattered helmet. And just like that, I remembered Shannon. I had put her out of my mind, concentrating on the next minute and how we would survive. Now here was her uniform, but . . .

I held down my gorge this time. And much as I hate him sometimes, I had the urge to go embrace Gale, to comfort him. I felt deeply for him and his cold, dazed attitude. I had gotten sick just disposing of Van's leg; but Gale . . . Shannon's body was nowhere to be seen, because while Carver and I had been out scavenging in the pit, Gale had done his job. I'm gonna tell you stories of what an ass Gale is, but I want to say this as clearly as possible: Gale's an ass, but under that, he's also a spacer. I'm not sure I could do all he did that day.

I hauled Shannon's suit to the dustlock, wiped off the blood, vacuumed off the sand, and hung it in a locker. Then I returned to the utility room and cleaned up the blood and sand from her suit. More wipes went into the composter.

Finally done with cleaning, I looked down. My sweaty white skivvies had become red: rust-colored dust streaks mixed with darker red smears. Van's blood . . . Shannon's blood . . . Great. We were extremely healthy, the best that modern nanomedicines could make us, but blood was still an infection risk. And it was on my arms and knees, too. I stripped out of my skivvies, scrubbed down with wipes, and added those to the composter. Then I hung my skivvies in the laundry cabinet. A combination of cleaning fluids and nanomachines would scrub them, separate the wastes, and pipe the residue into the composter. Shannon's skivvies were already in the cabinet, halfway through the cleaning cycle.

I pulled a survival blanket from a shelf and wrapped it around myself. I didn't care if I went around bare-assed, usually, but never on duty. Plus I may have felt sympathy for Gale, but I was in no mood for his leering. So I turned the blanket into a makeshift toga, and I returned to the workroom.

Gale was on the comm with Aames at a desk near the dustlock. Carver tended to Van and Elvio. I was ready to collapse, but I was too well-trained to go off duty without being relieved. I

crossed to where Gale could see me out of the corner of his eye, and I stood at ease.

Finally Gale noticed me. "Captain, hold a bit. Yes, Ensign?"

I straightened. "Lieutenant, I'm done cleaning the shelter, and I could use a rest." I didn't add: *And so could you*. Rank hath its privileges, but sometimes it doesn't hath a lot of sleep.

"What?" Gale looked ashen, drawn, and unfocused. I pictured the composter again, and I managed not to shudder. "Yes, Smith. It's been a bad day. Get some sleep."

I turned to leave, but the captain stopped me. "Smith, have Carver check those ribs first. Your suit comp shows repeated injuries there. I want to know how bad those are before you hit the bunk."

"Yes, sir."

"And I know you're tired. I hate to do this. But two hours. We can't spare more than that right now."

"Yes, sir. Two hours. I'll make good use of them."

"Dismissed." Aames and Gale went back to their planning, and I went to see Carver. He gestured at a bench folded up against the wall. Without saying a word, I pulled down the bench, sat, and unwrapped my toga so Carver could examine my ribs. If Gale wanted to leer, let him. I wasn't going to buck the captain's orders.

But Gale was too busy to notice, and Carver was too much of a nice guy to leer. Instead his eyes were like a quantum wave function: They moved from my face to my ribs and back, somehow without ever once crossing the territory in between. I almost laughed, and I suspected his dark skin hid a blush. He examined my ribs with a hand sonic, probed them with his fingers (making me gasp in sudden pain), and injected me with a dose of osteo nanos to treat hairline fractures that had shown on the sonic. Then he taped up my ribs, stood up, and looked discreetly away as I rearranged my toga to cover myself. Finally he spoke, subdued but no longer defeated. "Try not to smash those ribs again, and you'll be fine." He managed a slight smile.

"Thank you, Lieutenant." I stood. "I'm not smashing anything but my bunk for the next two hours." I walked to the water reservoir, filled a flask, and sipped at the straw as I went into the bunkroom and found a bunk. "Martian springs," I whispered. The delicious water kept me awake; but as soon as the flask was empty, I closed my eyes, and I was out.

* * *

My dreams were horrific, and sometimes they come back even now: buried in sand, gasping for water. . . . In the dreams, I'm alone, no hope of rescue. I fight harder, but the sand never ends. I suck on my straw. All I get is dust, choking me, and I spit it out. When I finally dig out from the mound, I slide down onto the Martian surface. I look down. My left leg is lost below the knee, my suit open to the rumbling winds of Mars. Instead of blood, what leaks out is a pulsing stream of deep red sand. . . .

* * *

I woke to a snore duet. Carver and Gale slept in bunks across the room. One of them should've watched over Van and Elvio; but with all we had been through, who could blame them for catching some rest?

I checked my comp. In less than ten minutes, Captain Aames would send his wake-up call. I hadn't gotten enough rest, not with that dream. I thought about ten more minutes of sleep, and how easy it would be to cocoon, hide from my troubles, and let depression and sleep wash over me until the end came; but I was afraid that dream would return, and it had wrung me dry. Besides, Aames expected better of me than to just give up. He wanted my best, and damn it, I would give it to him.

I tightened up my toga and got up from my bunk. In the workroom, I saw that the patients weren't forgotten: A camera on a tripod swiveled between van der Ven on the table and Pagnotto on the bench. I stepped in front of it and waved. "Hello?"

"Good morning, Ensign Smith," came the deep rumble of Ensign Chukwunwike Adika. The big Nigerian was a very private man. We didn't know him well, even after months of training and transit. But Aames gave Adika his highest recommendation, and the ensign was always calm and polite.

"Good morning, Adika." I looked at Van's diagnostics: a slight fever, but heart rate steady, and he slept. "How are they?"

Adika paused. "They are no worse. I wish I could say that they are better."

I looked at Elvio's readings. "It's early. Give them time."

"Speaking of time, I have other duties here. Do you relieve me?"

I nodded. "I'll watch the patients."

"Thank you, Smith. Adika out." The camera light turned off.

I went to the utility room, opened the laundry cabinet, and pulled out my skivvies. They weren't as white as when they were new, but they were clean enough. I pulled on my clothes, hung the blanket in the laundry cabinet, and returned to the workroom.

I walked to the reservoir for another flask of water, but the flask was only half full when a dark hand turned off the tap. I jumped. Carver had come up quietly, and he shook his head. "Sorry, we're on temporary rationing until the compressor and the composter can catch up. Our patients have first priority, especially van der Ven. We need to keep them well-hydrated."

The composter was an efficient recycler, but not 100 percent, and the compressor needed time to tease out water from the soil. We would have installed more compressors and other improvements, but that gear had been lost with the *Bradbury*.

Lost with that gear, of course, had been Maxwell, Weaver, Koertig, and Uribe. And Shannon, and Van's leg. I had no right to complain. So I took my half-flask of Martian Springs and sipped it slowly.

A voice came from the bunkroom. "It's a bloody waste of time, if you ask me. And water." I looked up and saw Gale leaning against the doorframe and staring at Van. "Pagnotto's going to make it, but van der Ven . . ." Gale shook his head.

In shock, I looked back at Van and saw that he was asleep. I wheeled on Gale and spoke in a low, calm voice. "Keep it down, Lieutenant. He might hear you."

"He's not hearing anything." Gale turned his eyes up from the exam table. "He's too far under. And he won't be with us long."

Carver glared at Gale. "You don't know that. The odds of post-op infection are low. There's nothing on Mars that can infect him."

"Explain his fever!"

Carver blinked. "His body is still adjusting to the damage. Maybe his therapeutic nanos are rebalancing."

Gale snorted. "And maybe we're just losing him."

"So you want to let him die? Just—" I almost said: *just drop him in the composter,* but that wasn't fair. I was pissed at Gale, but I had to remember that just hours earlier, he had saved Van's life. Not to mention dealing with Shannon. This had been harder on him than on me. So I tried to be calm. "I'm not ready to give up on him."

Gale looked down at his feet. "You're just like Aames. He never knows when to give up, and that's contagious. He makes you believe that nothing's impossible if you just push harder. Well, some things *are* impossible. Sometimes you stop pushing and accept the situation. We don't have enough to keep van der Ven alive."

"You don't know that."

"It's all about resources and how far we can stretch them. Far enough for the *Collins* to get here? The captain has some crazy idea we can rendezvous with them. That will never work, but they'll drop off colonizing supplies. We can use those, and survive until there's a real rescue. But only if our resources stretch that far."

"And we will!"

Without looking up, Gale shook his head. "The captain thinks so, but I don't see how. Even with stringent rationing, our resources won't stretch six months. That's not far enough, not if we try to support people who are going to die anyway."

"I'm glad Captain Aames is in command," I said.

Gale kicked his bare foot against the doorjamb. "Yes, Captain Aames, he'll push us to do the impossible. And he'll kill us all." He sighed. "But you're right, we know his decision: 'Everyone

is essential to our survival.' He'll make life hell for anyone who suggests otherwise. We're to keep van der Ven comfortable and get him ready for the trip."

I looked up. "Trip?"

"When the storm lifts, the captain wants us to get to Landing Strip B. It will be easier to maintain one shelter than two, especially as this one is damaged. He has a list of supplies to load into the crawler for a trip across Coprates." Gale swiped a finger across his wrist comp, and my own comp beeped. "Carver and Smith, get that list into the crawler, while I see to our patients."

I inspected the damage to my suit. Looking at the crumpled shell, I felt lucky that minor fractures were all I had suffered. Our body suits were made of a semirigid polymer that absorbs impact and shields us from most of it, but mine had cracked under pressure. Fortunately the vacuum resin between the layers had sealed the cracks and kept my air in.

Carver double-checked, and we certified the body suit for use even with the cracks. I scavenged Shannon's water system, patched up my environment pack, and asked Carver to inspect it again. When we were both satisfied, we suited up, buddy-checked each other, and returned to the pit. There we gathered up the captain's items into a travel case, then a second and a third. In the end we had five cases, each a meter square by half a meter high.

It was time to load the crawler, a low enclosed platform designed for medium distance travel when it was safer to drive than to risk flying in storms. Video showed that the crawler garage had survived the explosion: one wall was collapsed, but the rest had held. The crawler was intact: an ugly rectangular box, three meters by five and two high, squatting between eight giant wire wheels. Its center of mass was below its axles, making it stable in case of storms, but a pilot turret, a sensor tower, a winch, and cargo racks rose up above the box.

It looked functional except the sensor tower, which was twisted and snapped off. Communications and radar were out. In deference to my ribs, Carver climbed up the ladder and into the ruins of the turret. I watched through his helmet cam as he peered out at the Martian surface. "The storm has passed," I said.

"For now," Carver answered. "I wish van der Ven could make a weather forecast. Or even Deece."

"Nothing on the horizon. We should have time to pack and get crawling."

Carver paused. "Nothing on my detectors, either." He pushed the turret panels aside, watching them slowly fall to the ground. They blew up lazy clouds of dust that blocked his vision. Dust is different on every world. On Earth, it rises quickly, gets caught up in the thick atmosphere, and then slowly settles and blows away. On Luna, it sprays in fine jets, with no atmosphere to make it swirl into clouds, and then falls in smooth arcs like a shower of very tiny rocks (which is exactly what it is). But there on Mars, the thinner atmosphere let it fly farther before air resistance took over, and then the lighter gravity let it hang in the air for far longer. With the winds died down for the moment, there was little to disperse the dust. And so Carver kicked up a great fog all around him, and he had to wait over a minute before he could see his surroundings again. Then he had to brush his visor clean before he could walk the twenty meters to the crawler garage.

While Carver powered up the crawler, I moved the cases. By the time the last case was in the shaft, a cable hung down from above. I saw the crawler's winch hanging over the opening. Carver looked down, waiting. I clipped a case to the cable, and Carver winched it up and stowed it in the cargo rack.

By the time Carver was securing the last case, Gale walked into the shaft, supporting van der Ven beside him. We used a safety harness to lift Van to the surface, followed by Pagnotto and myself. Gale made a last inspection, shut down the base, and rode the cable to the surface.

While queued up for the airlock, Carver got on the comm to Aames. "Captain, the sensor tower is inoperative. It would take a day to repair."

"You're not waiting a day," the captain replied.

"Understood, sir. We'll have no radar, meteorology, or comms unless we stop to step out and report."

"We don't know when another storm may come. Don't stop unless there's bad news to

report. Good news can wait."

"Yes, sir." It was my turn in the lock, and I lost the comm signal. Carver came in after me, taking up the rear. Gale climbed up into the turret and sat in the pilot chair. His feet stuck down into the main cabin and rested on a padded footrest.

So began our trip across Coprates Quadrangle. We didn't go at top speed, since Gale had to scan the Martian surface for hazards, but we made good time. I took off my helmet and lay back on my couch. The wire wheels were great shock absorbers, so the ride was smooth. Soon the hum of the motor hypnotized me, and I grabbed more sleep.

* * *

I slept without dreams, and I woke feeling rested. The only light was the faint glow of instruments and the weak Martian sunlight leaking around Gale's legs.

I had slept over two hours. That was a good start, and I was too keyed up to go back to sleep. I sat up and looked around.

Immediately, I knew there was more trouble: Only one other bunk was occupied. Elvio slept soundly, but Van and Carver were missing.

I walked forward and stood underneath Gale, peering around the footrest. "Lieutenant!" I whispered so as not to wake Elvio.

Gale spoke in a low voice without taking his eyes off the Martian landscape. "Yes, Ensign?"

"Where the hell are Van and Carver?"

"I don't know what you're talking about, Ensign." Still he didn't look down.

"Bullshit!" I said too loudly, and Elvio shifted. I lowered my voice again. "Stop playing games. Tell me what happened!"

Gale sighed and glanced down. "That's enough of your disrespect, *Ensign,* but if it will quiet you down . . . An hour after we left, van der Ven abandoned the crawler."

"What!" Again Elvio turned. "Why the hell would he do that?"

Finally Gale looked straight at me, a sneer on his face. "Unlike you, he understands that he is a liability. We'll doom ourselves trying to save him. He is a better spacer than you. He made the decision you and Aames were too soft to make: to cut himself loose."

"Impossible! Van's not a quitter!"

"I only wish he had left his oxygen behind. We could use it more than him."

I was stunned. Gone was Gale the manipulator, Gale the lech: The face I saw was cold, calculating, only interested in himself. Stress brings out hidden sides to people, but this I never would've guessed. I asked, "And Carver?"

Gale looked back to the horizon. "He woke a little later, and he asked the same questions. When I gave the same answers, he demanded that I turn the crawler around."

"Hell, yes! What the fuck are you waiting for?"

"As I told him, *Ensign,* I do not take orders from junior officers. van der Ven was right. Who am I to undo his sacrifice?"

I wanted to scream, but I held back. "Carver went after him?"

Gale nodded. "Good riddance. We cannot know when a storm may come, so we cannot waste time on his heroics. He lacks the temperament of a good officer. Carver cannot make the hard decisions. Better that we're rid of him. Besides, that's more consumables for the rest of us."

"More consumables?" I shouted despite myself, and Pagnotto stirred. I made one more try to calm down. "Gale, turn this crawler around. Now."

Gale didn't look down. "I have had quite enough of your insolence. This discussion is closed."

I reached up, grabbed his boots, and yanked downward. Gale hadn't strapped into the chair, so he dropped to the floor, hitting both his tailbone and the back of his head on the footrest. The body suit protected his backside, and the padding prevented serious damage, but he was staggering when my punch landed on his jaw. In the low gravity, he sailed across the crawler and into a wall. He slid to the floor, semiconscious.

*That* woke Pagnotto. He looked at Gale and then at me. "Ensign?"

"Don't worry, Elvio." I bent down and checked Gale's diagnostics. "The Lieutenant . . . slipped."

Elvio nodded. "I have seen many such 'slips.' I am sure he shall be more careful in the future."

"Maybe, but just in case . . ." I lifted Gale up and stretched him out on a couch. "He should rest, for his own good. Can you make sure he stays there? I have to turn the crawler around."

*"Si."* Elvio nodded. "But why do we go back?"

So I told him the story. When I was done, he waved me away. "Go, Ensign. Drive. No one will interfere, I promise."

So I climbed into the turret and wheeled the crawler around in a wide turn. Our tracks were still visible, so we didn't have storm winds yet. Looking at the horizon, though, I couldn't be sure what was coming.

As I drove, I tried to call the captain, but the comms were dead, just as Carver had said. I tried calling him and Van as well, but nothing. I had made my move, and I would have to see it through. There was no one else to turn to.

Gale said Van left the crawler an hour out, and we had traveled two and a half hours. So I had at least an hour to drive. I could drive faster, but not too fast! I didn't want to miss any signs of Van and Carver. I concentrated on the tracks, trusting Elvio to handle things below. He got along with Gale better than I did, but I had seen disgust in his face when I told him about Gale abandoning Van.

I pulled up our route record. There was no sign that we had slowed near the hour mark; but at one eighteen, the track stopped for the length of an airlock cycle. Carver must've persuaded Gale to stop long enough to let him out. I sped ahead to that point.

As I reached the spot, I blinked. "Anson Carver, if you were a woman, I could kiss you!" I slowed the crawler. Just south of us stood a crude arch of flat Martian stones: two slabs standing and a third stacked on top of them. It was a clear message: *I was here!*

I saw Carver's tracks beside the crawler's. He had dragged something to make a clearer track—which was good, because the winds were picking up. Already the crawler tracks were blurred.

If I went too fast, I could miss something important. If I went too slow, the tracks could be wiped out. I settled on fast, but not top speed.

And sure enough, eventually I lost the tracks. *Damn it!* I brought the crawler to a halt.

"Any problem, Ensign?" Elvio called.

"No," I answered. "Just have to backtrack a bit." I shifted into reverse and let the computer's dead-reckoning keep us on course as I scanned for tracks.

*There!* The trail turned north, crossed the crawler tracks, and continued almost straight north, following a broad, indistinct track. That had to be Van, crawling. The two trails led quickly into foothills and then into low mountains.

I stopped. The crawler could handle slopes, but not well. I was torn: I wanted to rescue Van and Carver, but I didn't have the right to endanger Elvio. Nor even that rat bastard, Gale.

I climbed down from the turret and grabbed my helmet. "Elvio, I'm headed into the hills to help Carver with Van. Can you handle things here?" I glanced at Gale.

*"Si."* Elvio nodded. "We have an understanding. *Tenente* Gale shall not give me trouble."

"Thank you." I put on my helmet. "But don't wait too long. If we're not back in an hour, we've run into trouble that's too big for us. Don't come try to help, just get yourselves to Strip B." Elvio nodded again. I turned to Gale, who glared up at me. "But one hour, no sooner, Lieutenant. If you leave one minute before, I will march across Mars and give you a beating that will make that punch feel like a kiss." I shut my visor before Gale could answer, and I climbed into the airlock.

Once on the surface, I tried my comm, checking to be sure Aames wasn't listening in. I wanted this just between us. "Carver. Van. Answer me, damn it!"

At first there was only the static of the low frequency ground wave. Finally Carver answered, sounding winded. "A little busy here, Smith."

"Carver! Did you find Van?"

Van's deep voice answered. *"Ja,* I am here." He sounded tired, but alert.

"Van, what the hell's with this little hike?"

There was a long pause. "Stretching your resources. My fever is worse. I waste your water. Better I should die, so you may live. I crawl away so you cannot find me."

"You heard Gale!"

*"Ja.* Like a dream I hear him. He makes sense."

I shouted, "Gale's an idiot! He can't see the big picture."

*"Ja,* that is what Carver says: The captain has a plan, and it needs all of us. Especially me, he says. Without *Bradbury,* a meteorologist is vital, he says."

*Good job, Carver!* "He's right, Van. We'll never make it without you."

"I hope you are wrong." Van sounded depressed. "You must get by without me. Without both of us, since Carver refuses to leave."

"What?"

"The damned leg. It slows me down, and there is not time. From the mountainside, I see signs. Storm is coming. I tell Carver leave me, but he says no."

"We're not giving you up," Carver answered. "We just have to move faster."

I asked, "Could you use some help?"

Carver's voice brightened. "Sure! We could redistribute the load. But I'm not ordering you to put yourself at risk, too."

"Try to stop me, Carver!" I headed north. On Mars a jog is easy, even in a suit; but I made only a couple hundred meters before my ribs slowed me down. The osteo nanos could heal the fractures, but not if I forgot myself and undid their work.

I loped along, a slower gait but with less impact. Soon I topped the first ridge. The wind was stronger there: I heard the low rumble, and the tracks were blown completely clean. But on the other side, I saw more tracks a ways down, into the valley and up the next ridge.

There! On the mountainside beyond the ridge, there was movement. I zoomed my helmet cam. Carver and Van worked their way down the slope. Van held a crutch, but the slope was so steep, they were more climbing than hiking.

Another hand could help. I loped downhill, feeling each jolting step but too eager to let the aches slow me down, and then up the next ridge. Carver and Van were halfway to the valley floor, but the terrain was against them. Carver saw me and waved. I waved back and continued down to meet them on the mountainside.

I climbed up beside them. "When you decide to hide, Van, you don't mess around. Why did you climb so far up here?"

"I am a meteorologist," Van said. "From a small child, I watch the storms and try to understand them. So when I planned to die, I said, 'Not without climbing up to see *that.'"* He pointed west. I looked: Storm clouds were mounting, halfway to Phobos I swear. The winds were picking up. The rumbling was loud enough, I had to turn off my external mike. Even then, my helmet rattled now and again.

"Whoa . . ."

Van nodded. "Now you see, at last. Please, you and Carver leave me. I do not wish to die knowing I killed you, too."

"No one's dying here," I said. "We have to move faster. Here." I plugged my spare air tube into Van's environment pack. As I did so, I saw his vitals: 38.1 C, almost to the danger range. But I was more worried about air, and Van had plenty for both of us. I disconnected my own pack, and Carver helped me to remove it. Then I turned my back to Van, he hobbled up behind me, and he and Carver hooked his body suit onto mine using clamps designed for rescues like this. The official term was dorsal assist mode, but spacers call it doggy carry. It's an effective rescue carry in low gravity. I clipped my environment pack to Carver's. He had the heavier, less balanced load, as long as Van didn't squirm; but we were both balanced enough to climb, and we didn't leave behind precious air and water.

We descended as fast as was safe. In training, we had scaled worse slopes, so this was no challenge—except every time I looked west, the storm had snuck closer, like it was stalking us. With the Martian air devouring all sound, it was easy to forget there was a storm at all. Then I would glance up, and . . . *Wham!* The dark red clouds were that much closer.

Before long, we had to slow down. The winds were strong enough to blind us at times and make us misjudge our hand—and footholds. Soon they would tear us from the wall.

But then we were in the valley, sheltered from the worst of the winds. The dark clouds still stalked us behind the mountain, and I saw flashes of lightning, but for the moment, we were safe.

"Van," Carver asked, "can you walk these slopes?"

"Not in time. The storm will be here soon."

"How soon?" I looked at the time on my comm. "Oh, fuuuuuck . . ."

"What?" Carver asked.

"I told Elvio to head for Strip B if we weren't back in an hour. There's only eight minutes left. We'll never clear both ridges in time."

"Maybe he'll give us more time," Carver said, but he didn't sound confident.

And maybe Gale had talked him into leaving already. "One way to find out, sir: double time!"

Despite my aching ribs, I jogged the best I could with Van riding doggy. Carver ran ahead, hoping to catch the crawler, but a glance at my comm told me he would be too late. Another glance over my shoulder gave me chills: The storm front was now directly over the mountain, the biggest wave ever about to crash down upon us. There was lightning across half the sky, but it couldn't illuminate the red-black depths of the storm. Silent doom was ready to snatch us.

I looked back, and Carver had stopped at the top of the ridge. Had he seen the doom storm? Was he giving up? But he didn't look back; he looked down into the valley ahead. He waved me forward.

I ran faster, crying out on every other step; but a little rib pain wouldn't matter soon. Wincing and puffing, I pulled up beside Carver and looked down into the valley. There was the crawler, speeding between the two ridges.

I got onto the comm. "Elvio!"

A smug British voice answered. "This is your commanding officer, Ensign. Keep moving, we're short on minutes!"

We started our downward jog. I refused to look back. It felt good to be running toward something, not away, so I peered ahead. "You repaired . . . sensor tower!"

"You 'ordered' us to wait, you didn't say we had to be idle. The repairs aren't perfect, but they'll get us to Strip B. Pagnotto's a top-notch engineer, and I can follow instructions. When they're delivered clearly."

I thought about the punch. "Sorry . . . sir . . ."

"About what? I have a bump on my head. I do not recall how that happened, but I see more clearly now. So does the deep radar, clear enough for us to find safe terrain and make top speed. Which we'll need to outrun that storm. So shut up and run!"

I shut up. I ran. Before the end, I hobbled. The ribs hurt worse than when I cracked them. Carver helped us along, and we reached the crawler ahead of the storm. I looked back one more time. The storm towered over us like a giant ready to smash us with great red fists. Small rocks flew by as we cycled through the airlock. Gale punched the accelerator, and we were off to Landing Strip B.

* * *

### 4.Ascent Stage

The rear camera showed the storm on our tail the entire trip. Carver was at the sensor console, running images of the sky. Despite Van's fever, he leaned on Carver's chair and urged him to focus on different storm features. He was delighted with that storm, pointing out cloud banks, stratospheric lightning, cell formations, and signs of sheer wind. His only complaint: "I wish the Doppler radar worked. I could find cyclones!" I didn't want to think about cyclones. A guy I knew once had his entire semi, load and all, picked up by a twister, spun around, and dropped back to the road going the wrong direction. That load was heavier than the crawler! I kept expecting us to lift and tumble.

But we crossed Coprates without further incident. As we rode into view of Landing Strip B, Aames came on the comm. "Don't waste time, that storm's on your ass. The pit is open. Park on

the ramp. Move!"

"Yes, Captain!" Gale pushed the accelerator to the max. Soon we saw the pit doors standing open, along with two spacers standing ready to close them behind us. The shorter one could've been anybody, but the tall one could only be Adika. Gale slowed so as not to spray them with dust, and he smoothly turned the crawler in line with the pit and drove it down the ramp. Adika and his companion pulled the giant plates shut behind us. Gale stopped the crawler nose to nose with Lander 1, not centimeters between them.

That left us with a cramped exit. I had to back out of the lock and shuffle sideways to make room for Van and the rest. As I slid free, Adika gave my hand a hearty shake. "Welcome to Mars Shelter One." He turned to the lock. "Welcome, van der Ven. Do you need assistance?"

Van emerged crutch first and shook his head. "No, I must learn to use this."

"Please proceed to the access shaft," Adika said. "We have converted it to additional shelter." We passed through the tunnel airlock. On the other side, the Lander 1 crew had used ceiling and wall panels to wall off the rear of the shaft as a dustlock and suit locker. They had affixed panels as bunks up the wall of the shaft, turning it into a vertical shelter for the five of us.

At the top of the stairs a new airlock attached to the exit door, and the shaft was pressurized. They must've produced a lot of air to fill this space. Of course, they hadn't had to dig out from an explosion and cave-in—or amputate Van's leg and dispose of Shannon.

Aames waited on the stairs. "No one move," he said. "Let's not spread the dust any more than we have to. That dustlock can handle one at a time, so the rest of you *hold still!"* He crossed his arms and glared as Van hobbled into the dustlock. "Now Gale, tell me why you stopped and made nonessential repairs after I instructed you to make best time." I cringed, fearing a blowup.

But Gale was smart. He could've made a big deal about the punch, could've made us look like an insubordinate crew defying him in a crisis. Legally, he would've been right to do so. Instead, Gale proved he was a spacer, not a space lawyer. He lied through his teeth. That's Nick Aames's one unforgivable sin, but Gale did it anyway. "I understand, but on further investigation, Pagnotto judged we could do basic repairs very quickly, and that justified the delay."

Aames glared at him. "Justified it?"

Gale nodded. "In my judgment we needed the data."

The captain's eyes widened. "Oh?"

I saw Gale glance at Carver. They must have cooked something up, because Carver answered. "Yes, Captain. I'll need another orbit to confirm, but my mods to the motion detection algorithm have found the *Bradbury."*

With that news, Gale and Carver successfully distracted the captain. Aames leaped down the stairs, ignoring safety and Mars dust to crowd in beside Carver and stare at his suit comp. Then I saw something I've almost never seen: Nick Aames, exuberant. "Yeeeehaaaaw!" He slapped Carver's shoulder, and red dust sprayed through the air. "Martian Springs all around. Carver, Gale, you just put us weeks ahead of schedule!" And with that, our unscheduled stop was dropped. Aames had a plan.

* * *

Or I should say, he *already* had a plan, but now he had a better one.

His original plan had been simple: Convert the pit into a shelter for the two teams, tear apart Strip A for spare parts, do whatever it took to stay alive while we searched for the *Bradbury,* and scavenge it for supplies. If we didn't find the *Bradbury,* the backup plan was to scrape by, improvise more catalytic compressors for water, cultivate yeast using food rations as seed stock . . . and slowly, inexorably descend into hunger, cannibalism, and death, in the vain hope that some of us would survive until the *Collins* arrived.

If you think that's some grim joke, it's not. I saw his plans: how much water we could produce, how we would ration it, how long the food would last, and when we would start dying. He even had a suicide schedule to maximize the chances for the survivors. Just so no one could question his fairness, his name was first on that list.

But with the *Bradbury* found so soon, everything changed. His original priority had been expanding our air and water production. With eleven people, the shelter was overtaxed. Now

number one priority was the ship. She carried supplies to get us all the way back to Earth (with recycling) . . . Food stock. Hydroponics tanks filled with algae and ivy for oxygen as well as food plants. Water. Electronics. Spare parts. Hell, spare *landers.* And most precious of all: the mactory deck, a big disk that extended from the main hull on an axis tunnel and spun to create gravity. It held machining tools, stereolithography tanks, laser sintering macro factories, and nanoassembly tanks. With those tools and the raw stock to feed them, we could build a city.

So we had to get back to the *Bradbury.* "No sense sitting around," the captain explained. "We'll get more tired the longer we wait. As soon as it's safe, we launch."

His revised plan still had us expand air, water, and yeast production, but our main job was building a Mission Control center. We needed to get to orbit, rendezvous with the *Bradbury,* scavenge supplies, and land them safely at Mars Shelter One. We had power to get to orbit twice, even with a fully loaded lander. But landing . . . The landers were built for telepilot assist and weather reports from orbit. Without those, landing could be a disaster, especially weighed down by a hold full of supplies. We needed weather recon and ground radar to land in one piece.

So we built a meteorology station. Pagnotto designed a sensor mast to raise above the access turret and give us a high scanning platform. We would pull it down in a strong storm, but we couldn't land in a strong storm anyway.

Once Van recovered from his fever, he designed meteorology instruments, and Pagnotto, Somtow, and Roberts built them out of available supplies. Aames joined into these discussions, not as an engineer—though we all had some engineering training, it was a mission requirement—but as a veto. "No, you can't use that backup pressure circuit from the crawler lock. We'd lose air if the main circuit failed." "No, you can't take plates from the propellant factory roof. If dust gets in a propellant disk, it could blow apart an engine." "Yes, you can strip wiring from the wall panels, but be damned sure it's from the lights, not the air recirculators!"

The rest of us worked on construction, tended machinery, and expanded Mars Shelter One as Aames ordered. All except Carver: he spent his time on image processing algorithms, refining his plot of the *Bradbury's* orbit.

After four days of code-cutting and image-crunching, Carver emerged from the turret and crossed the Martian sands to consult with Aames. We were mounting the new meteorology package on the mast, and the captain was supervising—meaning he shouted when he thought we were working too slow, and also when he thought we weren't careful enough. Carver tapped the captain on the helmet and showed him his suit comp. The captain looked at the comp and shook his head. He and Carver touched helmets to talk in private, and he shook his head again.

The captain got on the team channel. "All right, get cracking! I want this mast up and testing in twenty minutes. As soon as it passes mooring and electrical tests, I want it online. Scratch that, bring it online as soon as it's up, and test while van der Ven scans for storms. Get him operational. I want accurate weather data in one hour. Then start cycling downstairs. Carver just advanced our schedule."

As soon as we were gathered in the larger shelter, Aames spoke. "We have a lot of news, so let's get to it. Things are going to get tighter, and in a short time they'll get impossible. Take a look at this orbit track and projections." Swiping a finger on his sleeve comp, he pushed an image to our own comps. It was a model of the Mars system, the big red planet against a black backdrop and two small gray moons spinning around it, Deimos slowly circling at six diameters out while Phobos sped by at barely one diameter. The captain tapped his comp, and the image froze. A silver dot appeared, almost as far out as Deimos, representing the *Bradbury.* Several transparent dots represented past sightings. A set of thin gray whorls circled around Mars, connecting the silver dots. "You've all seen orbital plots. Carver?"

Carver stood and paced. "These are estimated plots. Definitely unstable. Projecting into the future . . ." A wide yellow band appeared. "The instability is growing. It's tricky work with a single telescope, but I've rechecked my algorithms. They're solid. That's the range of likely orbits

two days from now." A pale green band appeared, much wider than the first. "Five days." He added a third band, pale blue and covering much of the screen. "A week and a half. Notice that the inner range intersects Mars, and the outer range may escape. It will take days to make more accurate predictions."

Gale looked up. "But you have *some* predictions?"

Carver's mouth turned down. "They're not good." The colored bands disappeared. In their place was a single white dot that moved around the screen, tracing out new whorls that swung farther away from Mars, then closer, farther, closer. And then . . . "My best prediction is that the *Bradbury* crashes somewhere on the south polar ice in nine days."

Gale pointed at the orbit. "How did it get this bad?"

"Good question," Carver said. "Here's the best image I can get of the *Bradbury.* There's not a lot of sunlight to illuminate it. It's more pixels than picture, but . . ." He pushed it to our comps and drew circles to point out features. "This dark blotch here is engineering. Completely blown out. From that and the captain's data feed, I can simulate the collision." He pushed out a slow-motion video: Lander 2 approaching too high and fast, ripping through the bow of the hull; the *Bradbury* sliding and flexing from the impact; the ribs of the hull ripping through the lander's engine assembly in turn; the lander's engine exploding, ripping the bow off the *Bradbury*—including the mactory deck!—and adding more wobble and tumble to the ship; and the lander slipping free, colliding with engineering at the aft end, sliding into the fusion reactor, and causing a coolant leak and the collapse of the fusion reaction. Seconds later—microseconds in real time—the reactor's magnets exploded, spewing chaff through space and adding one more tremor and yet another velocity vector to the *Bradbury.*

Carver tapped his screen. The simulation switched to real time. The collision wasn't done yet. The lander, pushed by the exploding reactor, ripped through two more compartments before its battered hull ripped free of the *Bradbury.* Atmosphere vented from the bow of the ship, giving another push. Then the ship tumbled further, crossing paths with the lander one last time. The lander bounced off the drive bell, cracked, and spun away in pieces.

We stared, open-mouthed. Gale asked, "How reliable is this simulation?"

Carver couldn't meet our eyes. "At least 94 percent. It fits all of our data. And . . ." He pushed out his pixelated image of the ship, this time in rapid motion in multiple axes. I saw nothing at the bow at all.

Somtow said what I was thinking. "The mactory deck is gone." The meeting exploded, everyone talking at once.

Aames shouted, "People!" We all went silent. "There's no time to panic. We needed what was on the mactory deck. We *still* need whatever's left on the *Bradbury.* Until the *Collins* arrives, *every* resource is vital. No sense missing what we can't have, let's get what we can. Now."

"Now?" Ensign Hsu pulled back up the orbital prediction. "It's at six days before the orbit gets too eccentric for rendezvous. Can't we take time to plan?"

"No." Aames shook his head. "van der Ven, tell them the rest of the bad news."

Van pushed out a Mars map overlaid with waves of storm clouds. "Another storm comes," he said. "Our Doppler radar has limited range, we cannot predict exactly. But the radar on the mast, it sees these." He circled the leading wave. "The rest I infer from our Martian weather models. This storm comes in three days, and it lasts at least three more, wave after wave with only brief lulls. Too brief for landing even if *Bradbury* could help."

"So that means now," Aames said. "As soon as we can. Carver, Hsu, Smith, you're my crew for this flight. Get a solid eight hours sleep so you're fresh. The rest of you, here's a work schedule to get us ready. Strip gear from Lander 1. Reduce mass and make cargo space. van der Ven, whatever you need for meteorology, add that to the top of the work orders."

Aames picked up his helmet to return to the main shelter, but Gale stood to stop him. "Captain, I should lead this mission. We cannot risk you."

The captain's eyes widened. "Negative, Gale. We need a pilot up there, and we need you as a medic down here. You'll be in charge."

But Gale didn't relent. "You might need a medic up there as well. Carver is a decent pilot, he

can fly the lander."

Aames answered, "Carver's good. If we salvage any automated landers, he'll telepilot them down. But for this flight, we need our best. That's me." He put his helmet on. "Now if you're done arguing, *Lieutenant,* my launch window is in nine-and-a-half hours." He closed the visor and entered the airlock. Carver and I found our bunks while the others suited up.

* * *

We sat in Lander 1, ready for launch. Aames hung from straps in the pilot pod, his skinsuit already wired into the ship's controls. Behind him sat Carver at the comm station, which Razdar and Roberts had adapted into a copilot station. He didn't have a skinsuit, but he could back the captain up on controls and observation. Carver was damn good with a computer. If anybody could do it, he could.

Behind Carver sat Bi Hsu and me. Hsu was an older Chinese astronaut, a short woman who had started her career with the Chinese National Space Agency, then transferred to the Space Corps when the Chinese joined the Initiative. Her hair was short-cropped like mine. Some gray showed in the stubble, but she passed all physicals with flying colors. She looked over at me with a smile, and I smiled back despite the situation. For a spacer, a launch is always a thrill.

The captain lowered his legs, and the rear of the lander dropped down upon the adjustable landing gear. The front gear raised at the same time, and we sat back at a sixty-degree angle, ready for launch.

"Meteorology?" Aames said.

Van answered: "Clear skies, Captain. Storm's moving faster than the model, so don't waste time."

"Launch pad?"

Adika answered. "Pad is clear of debris. Landing gear reads 100 percent."

"Ground control?"

Gale answered. "Telemetry green across the board, Captain. You are go for launch in one minute."

A formal checklist and countdown were unnecessary: Landers were designed for takeoff with no ground crew at all. But the captain was taking no chances. We sat and waited for the clock.

"Thirty seconds," Gale said.

Then "Fifteen."

Then "Ten . . . nine . . . eight . . . seven . . . six . . . five . . . booster igniters hot . . . two . . . one . . . Ignition!"

A giant boot kicked me in the ass, right through the thick couch cushions, and we were airborne as Gale continued his report. "We have liftoff . . . Forward gear retracting . . . Forward gear secured. Rear gear retracting . . . Rear gear secured. Lander is in flight configuration. Prepare for primary propellant disks in five . . . four . . . three . . . two . . ." And suddenly the giant push from behind us cut off. "One . . . Ignition." And the boot was back, kicking harder this time, and we leaped into space. "Primary ignition is green and green. You are go for orbit." Our solid booster propellant came in disks of fixed sizes and power, allowing us to add or discard disks as needed for our flight. It didn't give us the fine control that the liquid fuel main engines did, but it was better than old-style solid boosters. We would save the mains for navigation and rendezvous.

"We have this, ground," the captain said. "Get back to work. When we return, I want to see a proper landing facility."

"Yes, sir!" Gale cut out, and we flew in silence.

* * *

Sunlight at Mars is half as bright as at Earth, so it wasn't easy to pick out the *Bradbury,* but Carver's code picked it out on the scope, highlighting the gray dot with a blue circle. When we got closer, our spotlights illuminated the derelict ship, showing just how bad the damage was.

Carver's model had been optimistic. The *Bradbury* had a long gash through it, several cabins ripped open to vacuum. The mactory deck was gone, along with most of the bow. So much for Max: he would've been in the copilot pod in the bow. The drive bell at the aft end was crumpled, with a giant tear. It hung at an odd angle, almost detached. Three of the four cargo landers

were still docked, but the fourth was lost in the long gash. Landers 3 and 4 were nowhere to be seen. The antenna package amidships was undamaged, but the ship tumbled around two axes, too rapidly for the directional antennas to lock onto any signal. Even if anyone on the *Bradbury* had survived, there was no way to reach Mars without the directionals. Or Earth.

But as close as we were, we didn't need directionals. The captain spoke into the comm: *"Bradbury,* this is Captain Aames on Lander 1. Come in, *Bradbury."*

A warm female voice responded. "Lander 1, this is *Bradbury*. Your approach is unauthorized. Withdraw to a safe distance."

"Deece? This is Captain Aames. Report your status."

"Lander 1, this is Decision Control *Bradbury*. All contact with Captain Aames was lost seven days ago, and he is presumed dead. Your identity cannot be confirmed. Your approach is unauthorized. Withdraw to a safe distance, or we must take defensive measures."

"Deece!" The captain's shout echoed through the lander. "This is Captain Nicolau Aames. Override sequence one code one one A. Report, damn it!"

But Deece remained as calm as ever. "Lander 1, all override codes were reset upon the death of Captain Aames. Your attempt at override constitutes hostile action against this ship. Withdraw immediately, or we must take defensive measures."

"Carver!" The captain twisted to look back at the copilot station. "What's the matter with your damn program?"

Carver punched furiously at his console. "Total security reset, Captain. I'm trying to open command channels, but they're all blocked. Deece has had a breakdown."

"A breakdown? She's a program!"

"She's an AI, captain. She operates on situational models. When her models deviate from reality, she can get weird. Too far out of line, and she . . . 'regresses' to a known state. That warning she's issuing is from her construction phase, when unauthorized access could be a spy satellite or a saboteur."

"And what about these 'defensive measures'? We weren't armed."

"We weren't; but in the orbital construction zone, she could summon fighters. She still thinks she can. Don't worry, she's toothless."

"And useless. I wanted her to test the attitude jets, at least null that tumble. We can't dock like that; and even if we could, it'd be hell working in there."

Carver shook his head. "I could bypass her locks from inside, but not by remote."

The captain paused. "All right, maneuvering units, everyone. I'll get as close as I can. Smith, you'll go aboard as search crew. Your top priority is survivors."

I couldn't stop myself. "Captain, you can't expect—"

"I don't give up on people, Smith. Ever. We don't 'expect,' we find out. Look for survivors and for salvage. Find anything fragile or perishable, get it into a cargo lander. Anything that can survive vacuum, toss it out the nearest hatch. Hsu, you play catch: Whatever Smith throws out, you chase it down and throw it to this lander. Carver, you get to the main controls, straighten out Deece, and get me control of my ship."

That sounds like a desperate plan, but not if you're a graduate of Advanced Orbital Survival School. Boarding a derelict is a standard exercise in AOSS, and we had practiced it until it was routine. A two-axis tumble made it trickier, but the computers in our maneuvering units could rendezvous with a target site—in my case, an open cabin where I could get hold of a hatch and enter the main vessel from there. Then you just grab on, and you've matched course. You'll still get quite a jolt as the tumble hits you, but at least you won't collide with the derelict.

So imagine my surprise when I saw the hull of the *Bradbury* twist and swing toward me. Suddenly my approach angle was all wrong, and I was headed for a bone-breaking crash. I opened my mouth to shout.

Before I could draw breath, Carver's arm snaked around my waist, and a burst of MU jets pulled us away. Carver called on the comms, "Good news, Captain: the attitude jets are still functional."

"I can see that, Lieutenant," the captain answered. "And your AI has teeth."

"She does, but I'm still smarter than her. We'll get in."

"Make it snappy! We're on a time clock."

Carver braked at a safe distance from the *Bradbury,* and he turned me to face him. "Smith, are those bull fighting rumors true?"

"Bull *riding,* Lieutenant, not fighting. What do you have in mind?"

"Deece is an algorithm. Whatever she does, she does to a pattern. If I can see that pattern, I can defeat it. But one observation doesn't show me the pattern."

I nodded. "So you need to see how she reacts when someone approaches."

"Yep. She doesn't have a lot of choices, only a limited number of jets to fire. She's also constrained by the existing tumble. If I can see her react a few more times, I can predict her next move."

"Understood, sir." I turned back to the *Bradbury,* and I called out, *"Toro! Toro!"* I fired my MU and dove toward the hull.

Behind me, Carver called, "Keep your eyes open. Don't get too close!"

I liked his plan. That bull riding contest hadn't been a sanctioned event, just a bunch of drunken spacers camping on a ranch near São Paulo, so we had to do much the same thing: bait the bull, figure out his moves, and find a chance to leap aboard. Not smart, you say. Did I mention we were drunk? Pretty risky, you say. Did I mention we were spacers? We thrive on risk, or we wash out. Besides, no one was hurt, not even the bull.

I made a few passes at the ship. Once I knew what to look for, it wasn't as dangerous as that bull. Soon it was easy to see the signs and dodge out of the way.

Just as I was feeling smug, the ship made an unexpected turn. Instead of sideswiping me with the hull, it spun on its core, swinging the antenna package around and hitting me with the big Earth antenna like a giant baseball bat. I was stunned by the hit, felt another stab in my damned ribs—just when I was sure the nanos had finished their work—and twirled away with my own tumble.

Before I could recover my senses, Carver caught me. "Are you all right?"

I caught my breath. "All right . . . Just winded. Give me a minute, and I'll make another pass."

"No need." Carver pushed a program to my MU. "I've got her pattern. This will guide us through a tandem approach. We'll enter through different sites, and that will confuse Deece. Her reaction to you will cancel out her reaction to me, and vice versa. She'll kick at the last moment; but if you grab something and hold on tight, she won't shake you. You'll enter through engineering, I'll be up in secondary command."

I couldn't probe my ribs through the bodysuit, but my suit diagnostics were green. I nodded. "Let's do this."

Carver tapped his comp, and our jets fired microbursts, separating us. When we were thirty meters apart, our jets turned and fired again, hurling us toward the tumbling *Bradbury*. For a moment, I doubted Carver's coding, as I sped straight for the unyielding hull; but then the ship tumbled more, and the giant gash turned into view, and I was headed straight for the aft end. Still too fast! I held back my panic, trusting Carver; sure enough, the jets fired again to slow me down and align me with the ship.

Carver was *smooth!* Just before I could impact, the jets fired sideways, pushing me through a hole in the bulkhead and into engineering. Half a second later, the far bulkhead *kicked* toward me, bouncing me off, but instead of knocking me into space, the move knocked me to the far wall, where I grabbed a hand grip and held on tight. The ship tossed three more times in different directions, just like that bull, but my grip held. After the third kick, the ship settled down into a dizzying-but-steady tumble.

I opened the comm. "Lander 1, Smith. I am aboard the *Bradbury."*

An immediate answer came. "Lander 1, Carver. Same here. We are aboard and secure."

"Expedition, Lander 1," the captain answered. "Don't waste time! If you can null that roll, it will buy us time and consumables. But watch your backs! Deece may have more surprises. Go!"

My bull-riding experience served me well. The wall tossed and twisted, but I held on and got my bearings. The main reactor was gone, a charred mess where fire had fought to catch hold,

but had failed as the air fled the deck. Chaff from the exploding magnets had been as bad as fire, though, shredding the engineering consoles into tangles of metal, glass, and wires. On the plus side, that included the security monitors. Deece couldn't watch me.

The remnants of the reactor told me where I was on the deck. The inner wall had a hatch to the main shaft. Since the shaft itself had survived the explosion, surely the hatch had as well.

Timing the tumble, I leaped back to the inner wall. I hit with a bump, enough to rattle me, but I grabbed another grip and worked my way around the shaft. I felt a few stabs in my ribs as I twisted in odd directions, but nothing near as bad as jogging across Coprates.

I rounded the shaft and saw that it had sheltered the far half of the deck from the worst of the explosion. Consoles on that side looked functional: air and water recycling, waste processing, and reaction jets. Maybe if Carver couldn't shut down Deece, we could manually control these systems from here.

I worked my way to the hatch and checked its readouts. Automatic access was offline, but all hatches had manual controls as well. The readouts showed no pressure on the other side, so I didn't have to try to enter against pressure. I opened the cover on the manual controls, pulled out the handle, and gave it a twist.

The hatch sprung open, throwing me across the deck. Damn Deece! The readouts had been a lie. I was glad the hatches had hydraulic brakes to slow them down. Otherwise the hatch could've hit me hard enough to crack my bodysuit. I slammed into the wall, bouncing off and right back at the hatch. I put my left arm up to shield my visor, while with my right I scrabbled for a hold. I barely got a grip on the hatch edge, enough to slow me down. I lowered my left arm, reached inside the hatch, and grabbed the inner controls. That gave me a good enough grip to swing my legs up and pull myself into the main shaft, even against the escaping air.

If I'd had to pull the hatch shut, I could never have done it. Interior pressure was one atmosphere, 14.7 pounds per square inch, and the hatch had a lot of square inches. Adika himself couldn't have pulled it shut without help. Fortunately, I had more hydraulics. I pulled on the close lever, and the hatch sealed itself.

I breathed heavily as I got on the comm. "Carver . . . Don't trust readouts. Deece is using them to mislead us."

Carver sounded concerned. "Smith, Carver. I read you. So does she. Think."

Damn. Anything we said on the comms, Deece would know. We would have to stay off comms unless it was critical. Carver was on his own, and so was I. I turned off my mike.

Aames wanted the perishables first. That meant hydroponics, two decks forward of engineering. Hydroponics split that ring with storage, which had been torn open. I thought the hydroponics cabin would be undamaged, but I had to go in to find out. If we were lucky, that cabin was full of racks of Lada gardens: Russian-designed automated garden units with self-contained environments for circulating nutrients and air. If those survived, it would be our own little slice of Eden.

When I got to the cabin, the readouts looked bad: VACUUM. RADIATION HAZARD. BIO HAZARD. FIRE. Fire in a vacuum? "Deece, you're a lousy liar." That was a known fact, Carver had taught me: AI's draw inferences from limited models, so deliberately incorrect inferences were hard for them to formulate. Deece wanted to scare me away from hydroponics, so she raised the alerts. All of them, as contradictory as they were.

But maybe *one* of them was true. A fire would destroy hydroponics and cook me in my suit. So I pulled the manual hatch controls with caution and looked inside.

No fire. No signs of rushing air. I would take my chances on bio hazard and radiation. But I hadn't expected the Lada gardens to be dismounted from their racks and packed for shipping.

"What the hell?" I saw movement from the far corner, a figure bobbing near a garden and pulling lettuce out. I pulled myself inside, closed and locked the hatch, and turned on my external speakers. "Dr. Weaver, is that you?"

Anna Weaver, our ship's doctor and telepilot, spun around. She saw me, her eyes lit up, and she leaped across the cabin at me. "Smith!" She wrapped herself around my bulky suit in an awkward hug, throwing us back against the hatch. "Thank God, you made it!"

I pulled free of her arms. "Thanks to Captain Aames, who will be glad to see you. Is there anybody . . ." But my voice trailed off as her face fell.

"Koertig and Uribe were in the mactory deck, doing maintenance on Landers 3 and 4. And Max . . . I heard him scream before comms cut out. I'm sure his death was . . . instant."

I didn't react. I had already said goodbye to Katja and Normando and Max. And Anna. We were all so sure we had lost everyone. All of us except Captain Aames. He never gave up.

"So how did you survive?"

Weaver swallowed hard. "When Max was sure a collision was coming, he sent me down the main shaft, ensuring that all the cabins were secure. He was thinking about salvage and how much we could preserve. He said Deece was flaky, we couldn't trust her to secure the hatches."

I nodded. "He wasn't kidding."

"So I was well down the shaft when the lander hit, but the telepilot pod was wide open to the shaft. As soon as the pod was breached, air started whooshing out the bow. I grabbed the nearest hatch and shut myself inside before the shaft was in vacuum. I was lucky it was the hatch with the food."

"Lucky," I agreed. "But the shaft is under pressure now. The forward emergency hatch must have sealed."

"Under pressure?" Weaver indicated the readouts. "It shows vacuum out there."

"Deece is more than just 'flaky,' doctor. She has flipped into security mode. She thinks we're intruders. She's using the fake vacuum to keep you a prisoner here."

Weaver nodded. "That makes sense. I had no suit, so I was stuck. Deece told me I was unauthorized. Finally I turned off her pickups here."

"And then you started packing up the food?" I waved my arm at the Lada units.

"Uh-huh." She pushed over to the units and inspected their meters. "There were two possibilities. You were all lost down there, dead or trapped, and it was only a matter of time until I was dead, too. I would eat well until the end, and the Lada units would give me oxygen. Or you would survive, get back to orbit, and come for the food." She smiled. "I bet on Captain Aames, so I figured I would save time if I got a head start on packing."

I admired her faith. I had known Aames a long time, but I was still learning to trust him like that. "We should get these to the cargo landers immediately. But . . ."

Weaver looked at me. "What's the matter, ensign?"

I stared at the hatch. "There was pressure out there before. There might not be now. Deece is protecting the ship from us, trying every trick she can think up. The only weapon she has is deception. She might open a hatch, and you're exposed. I need to get you a suit."

We moved Weaver and the Lada units far from the hatch before I carefully opened it. There was no airflow, so I dashed out and resealed it behind me. Then I went to the suit locker, pulled out Weaver's suit, and hauled it back.

When I got to the hatch, I had a new surprise. The screen was blank. I tapped on it, and nothing happened. Swiped the soft reset code, and still nothing happened. Finally I swiped the hard reset code, and the readout rebooted. The readouts were back to normal, showing standard ship's pressure and temperature inside.

I didn't trust Deece, so I took a chance and called Carver. "Carver, Smith. Anything I should know?"

Carver's voice was relaxed, yet terse. "Smith, Carver. I have Deece in maintenance mode. *Now* she's toothless."

"Good job, Lieutenant!"

"But I'm still trying to get control of the ship, so I hope you can handle the cargo without me."

"Oh, I can." I smiled, though Carver couldn't see it. "Dr. Weaver's alive!"

Carver stammered. "Fantastic! Okay, you two get to work. I'll stabilize the *Bradbury* as soon as I can."

I was ready to sign off, when it occurred to me: *What if this wasn't really Carver?* Deece could fake audio easy enough. "Carver, when I was in the top of the access shaft at Landing

Strip A, remember that?"

Carver paused, confused. Then he responded. "Oh, verification. Yes, Ensign."

"I dropped a bolt. What did you say about it?"

"I said it was coated in butter. Now can I get back to work?"

I grinned. "With my compliments, Lieutenant. You do nice work!"

While Weaver suited up, I called Aames to fill him in and get instructions. "Do we still toss gear overboard?"

"Negative. Hsu, get aboard the *Bradbury.* Pack the cargo landers, and then pack up everything you can find that will fit in Lander 1. The more cramped we are on our ride home, the better."

We made great time thanks to Weaver having prepped the gardens for transport. We were two-thirds done when Hsu joined us, so I left them and went ahead looking for other items to ship. The captain had given me an inventory of crucial items, so I hunted those out first, stuffing them into bags, and hanging them from hand grips in the main shaft. Weaver hauled the bags to the cargo landers while Hsu inspected each cabin for other valuables. Without having to watch for Deece's next trick, the only challenge was the constant tumble of the ship, but we managed that. That was just like an exercise.

I neared the front of the ship, right behind the forward emergency hatch. Beyond that were our personal cabins, the command deck, and the wreck of the telepilot pod. Those were all in vacuum, so we would wait to try to salvage from them. I turned to the next hatch, Computer Control, and went in.

"How ya doing, Lieutenant?" Things were going better than I had dared hope, and I was in high spirits.

But Carver's brow was creased with concentration. "Busy here, Smith." He had strapped himself to the main station so he could work as the ship tumbled. The cabin was dark, the light from his monitor playing across his face. He looked more intense than he had on Mars, more in control.

"I'm just gathering." I bounced around the cabin, shining my light around, but there wasn't a lot we needed there. I gathered up some storage blocks and some tools, and I shoved them in a bag.

I glanced over Carver's shoulder. As I watched, I recognized what he was doing: He had disconnected Deece from the controls, and he was slicing out her historical models, starting from the past and working forward. The model is like a thread through time, a series of historical models stitched together. These give Deece experience, an awareness of time, not just the present. Each historical model combines data from the sensors, the AI's knowledge base, mission parameters from the Initiative, and a base model shipped up from Earth. Each new historical model is grafted onto the end and tied into Deece's knowledge engine. That's what she uses to make her decisions.

Slicing out a model, especially a middle model, leaves a break in the thread. If you don't patch that, splice together the ends, then the whole model is flawed. But if you *do* splice the ends together, the knowledge engine will still be misaligned, because some conditions will change across the splice. The Functionality Quotient will drop, and it will take patient work to readjust it.

I saw that Carver was splicing the broken end to a model from . . . five weeks ago? He had sliced out as many as three dozen models. Why was he going through this?

Suddenly it struck me. "You couldn't fix Deece's current model. It's tied to all of these old models, and there's some flaw in there somewhere."

Carver kept working, but he smiled. "Very good, Ensign."

"You couldn't just slice out her current model, there are guards against that. But you can slice out everything *except* the current model, one at a time. You're going to splice her to a known state, and then let her fix any anomalies from there."

"With a little training, she can get to an acceptable Functionality Quotient. This is a hole in the security system, but you'd have to be aboard the ship to exploit it. *And* you'd have to be the

best damned programmer you ever met." Carver's smile turned into a broad grin. I'd never seen him at work on the computer like this. Here he had real pride and confidence. If he could get that in other areas, Aames would sit up and take notice. "I went back far enough to make sure the model was clean, so Deece is going to have the AI equivalent of the world's worst hangover. She'll have a lot of gaps to fill in."

I didn't want to disturb Carver, so I hooked my comp into the system to review his work. Maybe I could learn his trick. I went back to the first model he had sliced out, and I watched the recording of his work. His steps were fast and smooth: shut down the knowledge engine; scan the model thread to find the target historical model; run a slicing tool to disconnect it from the thread on both ends; run an input probe to find all the matching codelines on the two ends; build bridgelines where the codelines didn't map well; and then check the splice for minimum F.Q. It failed, so he tried again, building stronger bridgelines where he saw problems. This time the splice passed the minimum F.Q., so he powered up the knowledge engine and ran it through training exercises until it reached operational F.Q. Then he moved onto the next historical.

He was applying simple, automated tools. Anyone could do that. But how he selected the codelines to splice together, that intrigued me. A codeline was a bit of genetic algorithm, more grown than programmed, and it was hard to comprehend how they worked. They just *did,* because the system eliminated the ones that didn't. So how did he identify the splice points? I looked at the next slice operation.

Then I saw something familiar: This historical had come from the Initiative on Earth and had been grafted in by Gale. I rewound to the first slice. It was also a historical grafted by Gale. I fast-forwarded to the third: the same thing. And . . .

"Carver, these models . . ."

"What?" He looked at his screen, swiped something, and suddenly my screen went black. I never knew he could do that. "Forget it, Smith."

"But they all—"

"Forget them, Ensign. That's an order." He sounded stern, like I had never heard him before. He looked up at me, and the light from his monitor glistened from moisture in his eyes. His tone softened. "Please."

"But sir, the captain needs to know this. These models that you're slicing out: every one of them came up from Earth and was grafted right into the thread immediately. By Lieutenant Gale."

"So?"

"So you're cutting them out! That must mean they caused Deece's malfunction. They caused . . . Gale caused all of this."

"We don't know that, Smith."

"Then why are you slicing them?"

Carver turned back to his screen. "Because I want to get to the last point where I *knew* things were right. Before . . . Gale started checking in updates from Earth."

"Before Gale screwed us all, you mean! The captain *needs* to know this."

"To know what? That Gale did his assigned tasks according to the recommended procedures?"

"What?"

Carver nodded, bobbing in his harness. "Smith, Gale is a pompous ass, but he's all about procedure, about checking all the right boxes so he looks good to the higher-ups. He did *exactly* what the manual says. He just didn't do any *more.* I would've done model consistency tuning, because the grafts from the Initiative never line up with reality. Some damn *bureaucrat* down there 'knows' that his model is right and keeps blowing off my corrective responses. The variances are small, in the second decimal usually. But Gale was cross-training for my post then. I told him about the tuning, but I don't think he understood. There's no record he ever did it."

"And that caused Deece to flip out!"

"One more time: we don't know that. There might be some other problem, something even

I wouldn't catch. I can't trace down what's wrong now, and I tried. All we know is Deece was stable at one point, and now she isn't, and we need to regress her back to stable."

"But . . . Gale . . ."

Carver pulled back from his screen and crossed his arms. "Smith, why was Gale maintaining Deece? Do you remember?"

So much had been going on in those final weeks of Mars approach. "We were all cross-training. Gale was on your post, I was in medical, and you . . . pilot, right?"

He pointed a finger at me. "The captain and Max kept me so busy, I barely had time to sleep. So maybe it was my fault. Maybe I should've supervised Gale better."

"That's . . . not . . ."

"Not possible? Damn straight it's possible! But like you said, right now, I don't give a damn. I only care about surviving until the *Collins* gets here. And the captain has a plan, and it needs everybody. We can't afford any rifts. If we don't work together, we're dead. If the captain and Gale have it out, it won't be good for any of us."

"But Carver . . ." I tried to calm down. "Carver, it's not good to keep secrets from Captain Aames. He always finds out, and he won't tolerate lying." At that Carver laughed, and I stared at him. "What?"

Carver rubbed his chin. "That time in my pilot training, when the captain chewed me out so the whole ship heard it. You never heard what happened, right?"

"No." We all knew about the collision, but no hard facts.

"And neither did the captain. Not the *real* story. The captain read me the riot act for steering my lander too close to Max's. I spent two weeks on lander maintenance for that. But what the captain never knew was *Max* collided with *me*. I made a rookie mistake, clenched up in the pilot pod, and I lost control of my lander. I was on a collision course, almost as bad as . . ." He waved his arms around, swaying in the harness. "I was on course to *kill* all of us. Scared the ever-loving piss out of me, which only made me clench up worse. Max kept his cool, flew his lander into mine, and pushed me out of my collision course. It nearly ruined Landers 3 and 4, and it went on my record as a pilot-at-fault collision. But Max never told the captain the real story."

I could hardly believe my ears. "Max kept a secret that huge from Captain Aames?"

"I was going to go to the captain, confess my sins, and Max stopped me. 'Anson,' he said, 'don't be a damned fool. You screwed up, but it's a mistake you'll never make again. I'm sure of that. You deserve punishment, but you also need something Nick Aames has in short supply: mercy.' So he gave me his mercy. I certified as a pilot on our next round of cross-training, because Max gave me a second chance. Smith, this team needs Captain Aames pushing us to be our best, but it also needs someone giving out mercy and second chances. The captain doesn't understand that, but somebody has to."

I thought about his words. "So since Max is gone, you're appointing yourself? It won't be easy. You'll have to stand up to the captain, make him back down. Max is one of only a couple people I've ever seen do that."

He let out a long sigh. "I think I'm ready. We'll find out when the time comes. Besides, who else do we have? Gale?" At that we both laughed. "No, it's me. I have to figure out this job. I owe it to all of you." He lowered his eyes. "And to Max. So what's it going to be, Ensign? Do we forget what you saw in those models?"

It took me several seconds to decide. Carver was growing. Mars was forcing him into it. And I trusted the man he was growing into. I nodded.

"Good!" Carver wiped his hand down his screen, and the room lit up. "And just in time. Deece, diagnostic summary?"

Deece's cool voice sounded from the console. I shivered. "Controls are offline, and there is a significant gap in my model thread, but codelines and bridgelines are interpolating the differential. Functional Quotient is 81 and rising. 83 . . . 84 . . . 86 . . ."

"Good enough, Deece, I'm hooking you back into ship's controls. Please analyze and null this tumble with minimal fuel expenditure." Then he switched to the comms channel. "Weaver, Hsu,

brace for acceleration in . . .” He looked at his screen. “. . . seven seconds. Six . . . Five . . . Four . . . Three . . . Two . . . One . . .”

The attitude jets fired. We heard the rumble, just as we had many times on the trip out; only now they reminded me of the low, quiet, stealthy rumble of a Martian storm stalking me, and I just wanted them to stop. I held my cool as they tossed us here and there. After half a minute, the jets cut out. I let go of my grip, and I floated in freefall. I didn’t drift toward any wall, I just hung there. We were stable.

Carver got back on the comms. “Lander 1, this is *Bradbury*. Captain, we don’t have enough fuel to correct the decaying orbit, but our tumble is nulled. You’re welcome to come aboard.”

*“Bradbury,* Lander 1. Good work, Carver. Reestablish ground communications, and find what’s left of the mactory deck, wherever it is. Make it snappy, I’m on my way in. Aames out.”

The comm clicked off, and Carver stared at it. “Always pushing . . .”

I floated closer and patted him on the back. “You have your work cut out for you, Lieutenant.”

* * *

I met the captain at the lander dock, Weaver and Hsu floating behind me with a flotilla of packing crates and bags. “Shall we start packing, sir?” I asked as the hatch slid shut.

The captain raised a hand. “Hold off, Smith, that depends on Carver.” He opened a channel. “Lieutenant, have you finished those tasks?”

Carver’s response was crisp and confident. He might figure out the captain yet. “Yes, sir. We’re sending down weather data now. It’s not good, sir: van der Ven says the storm’s coming faster than he predicted.”

“We’ll deal with that. And the mactory deck?”

“I found it, sir, and it’s mostly intact, just tumbling like a dervish.” He pushed a video to the general comp circuit: a large, faint disk shape with a long, bent shaft extending from the center. The combination tumbled at least three times as fast as the *Bradbury* had. Two blobs on opposite sides of the disk were the missing landers in their maintenance cradles.

The captain frowned. “More tumble than I expected. How’s the orbit?”

“Not good, Captain. More eccentric than the *Bradbury’s,* and decaying faster. Two, maybe three more orbits before it crashes.”

“Well, which is it, two or three? I don’t need guesses, Carver, I need data. Figure it out!” The captain turned to Weaver. “Doctor, climb aboard. I need you to pilot me over to the mactory deck so I can board it and salvage whatever we can before it crashes. Then you hightail it back here and load up the Lander. I’ll put whatever I can get into Lander 3 and then bring it down to Mars.”

“Captain!” I shouted, earning me a glare from Aames.

“Ensign, shut up. We *need* those machine tools, people. Our safety margins are practically zero without them. With them we have a very good chance. That’s worth risking one person.”

“But not you, sir.” I wasn’t ready to back down. “I’ll go. We won’t survive without you, sir.”

“The hell you won’t, Smitty. You’re a good crew, and I’m leaving you good plans. Follow them to the letter. That’s an order. But this mission needs a pilot. Carver’s not ready for this, and Weaver’s too valuable. Having a doctor increases your odds more than a captain does. I’ve worked the scenarios, and this is how it will be. End of discussion. Weaver, get aboard.”

Dr. Weaver had no choice, not with a direct order. She pushed toward the lander hatch. But it didn’t open.

Aames reopened his channel. “Carver, I thought you had Deece under control!”

Carver’s face appeared on the comm, and I saw sweat bead up on his forehead and hang there in zero gravity. This soon after assuming Max’s role, and already he was up to something. But did he have the guts to knock heads with Nick Aames? *Make this count, Carver.*

Carver’s earlier confidence reappeared. “I can’t let you do this, Captain.”

“Carver, you’re relieved.” Aames turned back to me. “Pull him away from that console. If he touches anything, break his fingers.”

I looked at Carver’s face. If he had pleaded with me, I would’ve followed orders. Instead, his

nerve held, and I didn't move. Carver answered, "Captain, I can teleoperate Landers 3 and 4 through Deece, just like I locked your hatch. It's not as smooth as a telepilot link, but I can do it. I've already powered up their engines."

The captain looked at me and pointed forward; but I held my ground, so he turned back to the comm. "What good will that do, Carver? Two lander drives won't be enough to stop that tumble, and they're not enough to lift the deck to a higher orbit. You're costing us time, Lieutenant!"

"No, sir, I'm buying us time. I can do this, Captain! Watch your screen."

We turned to the comp screen. The deck's orbit was changing: not higher, but lower. Carver put the mactory deck into a dive toward Mars. The captain shouted, "Carver! You fool!"

And then, precise as clockwork, eleven kilometers of rock came into the screen on a fast orbit: Phobos, the inner moon of Mars. The mactory deck dove in front of it, practically on top of it—close enough that the gravity of Phobos, weak as it was, grabbed the deck, swung it around, and slung it out into a higher, sweeping orbit. Carver used the landers to nudge it still higher and to level it out. Even the tumble had slowed, thanks to Phobos's weak tidal forces soaking up some angular momentum.

All eyes blinked. I snuck a look at the comm screen, and Carver grinned at me. I winked back.

Finally Aames spoke, very calmly. "Carver, why didn't you tell me this plan?"

"When I saw the solution, we had only one chance, sir. And it had to be immediate. You would've told me I couldn't do it."

"You're damned right I would've. It was a damn fool plan. And if you stopped to argue with me, it was no plan at all." The captain drew a big breath and raised his voice. "All right, everyone on board Lander 1. Carver, get your ass down here on the double."

"Sir?" But Carver didn't sound afraid. He had impressed Nick Aames in the only way possible: by being right.

And the captain admitted as much. "We'll have three landers at the mactory deck, Carver, so we're going to need three pilots. Apparently you are one. And a damned good one, Lieutenant, and maybe a good officer someday. Chief Maxwell would be proud."

"Thank you, sir."

* * *

### 5. Orbital Rendezvous

I could tell you the rest of that expedition: how we intercepted the mactory deck, got the macroassemblers and the nanoassemblers and the machine tools and the raw stock; how we returned to the *Bradbury,* packed up the hydroponics, and launched everything else that we could into a stable parking orbit; and how by the time we finally returned to Mars, the storm was upon us, and we nearly lost Lander 3, but weather reports from Deece and radar from the ground brought us all down safely. Oh, Carver and I had to divert at the last minute and ended up at Strip A, but we had shelter there, just like we left it.

And I could tell you how we retrieved our loads from orbit and expanded Mars Shelter One, adding the greenhouse and the machine shop and another habitat wing. I could tell you how we used the *Bradbury's* remaining orbits to briefly reestablish contact with Earth and the *Collins* so they would know we were still alive. I could even tell you how we finally lost the *Bradbury,* crashing right on schedule onto the south polar ice. I took some great videos of that.

But that's all in the mission reports; and it's anticlimactic, because it all ran according to Captain Aames's plan. And increasingly Lieutenant Carver's plan. They were still feeling out their relationship and establishing their territory, but they were clearly becoming a partnership. Carver's right, Aames needs someone he can trust as that buffer, someone who sees his worst and then decides how much of it to let through. And deep down, I think Aames knows it, too.

Gale was still second-in-command, and he bristled at Carver's expanded responsibilities. It wasn't proper delegation of authority. One day he and Carver took a hike across the Quadrangle and had a meeting of the minds. After that, Gale deferred to Carver any time Carver had an opinion, and we could tell who was really second-in-command from then on. Only fools fight in suits, so I don't think it was like my little dustup with Gale. I think Carver simply told Gale about

the historical models, and how furious Captain Aames would be if he found out. I think he offered Gale a little mercy, but with strings attached. Gale became bearable, and he carried his share of the work.

So we followed the captain's plan, and we survived. We didn't have fancy dinners, but we had food and water and air and shelter. We lost a lot of weight, but we stayed healthy. We even found time to do some real Mars science, justifying our presence there a little bit. And we expanded Mars Shelter One, turning it into a full service spaceport with assist services so that a wider range of landers can use it. Carver renamed it "Maxwell City," and that name has stuck.

One night Van came running out from the turret to join us on the Coprates plains. Pagnotto had promised him that his new prosthetic leg would work both indoors and in a suit. Van now ran everywhere he could, and he had promised Pagnotto a whole keg of beer in gratitude. The beer would have to wait until we made it back to Earth; but suddenly that seemed a lot more likely.

Carver swiped his comp, and our heads-up displays lit up with tracking circles, helping us to pick out the white dot of an approaching spaceship: the *Collins.* We cheered and applauded and hugged as closely as suits allowed.

Adika checked the heads up readings. "Fast. Very fast. Captain, are you sure you can catch that?"

The captain sounded casual, confident. "With the modifications Pagnotto and Somtow made to Lander 1? No ordinary pilot could do it, maybe, but I will. Trust me."

And we did: We trusted him, and Carver, and their partnership. They had gotten us this far, they would get us home. In three weeks, we would rendezvous with the *Collins* on its second cycler pass, and we would be on our way home. We all stood in silence at the thought of leaving Mars at last.

---

*Martin L. Shoemaker writes software by day and science fiction by night. His work has received the AnLab award for Best Novelette 2015 ("Racing to Mars"), the Washington Science Fiction Association Small Press Award ("Today I Am Paul"), and third place in Writers of the Future ("Unrefined"). You can learn more about his fiction at* http://Shoemaker.Space.