Chapter 1

Ross Sea Coast
Antarctica
May 2123

For the first time in his life, Roscoe felt cold.

For the first time, he wanted one of the puffy jackets he'd seen on faded posters in his internship academy, a converted ski lodge. Instead, just before the submarine hatch had been opened to the Antarctic night, a light bundle was dropped onto Roscoe's lap by a passing crewman. "Put these on," he shouted down the aisle. "Remember your safety briefing. You have three minutes!"

Stiff-necked from the jump seat, groggy from hours of sedated sleep, but grateful that the scabs he'd cut into his wrist three weeks earlier hadn't burst, Roscoe slid into the coveralls he'd been given. Drawstrings cinched the foil-thin plastic tight around his waist and closed the hood around his face, leaving just enough room for his eyes. *This* was supposed to keep him alive in Antarctica?

The sub crewman didn't seem to think so; he donned a big, puffy jacket and pants like the old-time skiers. Once the dozen bunny-suited interns lined up down the sub's aisle, he shouted, "Sorry for the inconvenience. Another sub was delayed leaving our slip at the port due to a mechanical problem. This is the only way to get you out and keep

water loading on schedule." The sedatives and the swaddling stifled any objections.

"We are going to disembark via Spigot's external pier. When you step outside, you will see a red searchlight directly ahead. Follow me down the pier single file toward that light. We will be outside for approximately five minutes." A few hooded heads nodded in front of Roscoe. The crewman turned and headed for the hatch. The interns followed, Roscoe bringing up the rear.

The cold sank deeper into his bones, and by the time he reached the conning tower's hatch and looked down at the pier, his toes were numb. He stared down the long, gray band stretching toward a red light glowing under a sky dense with stars. On either side of the pier, the starlight glinted off the water, illuminating a network of narrow, shifting channels between dull white sheets—thin as pie dough stretched across the waves. In a few spots where the channels widened, chunks of the same pale hue bobbed gently. It took Roscoe a moment to recognize what he was looking at: fragments of Earth's last sea ice, floating just beneath the path to his new home.

"Get movin', we got a schedule to keep," another crew member shouted.

As soon as Roscoe stepped onto the pier, the hatch slammed behind him and wind blasted his left side. He widened his stance to brace himself. Both feet slipped, his legs splayed apart, and Roscoe fell on his backside.

He sat up and turned, just in time to see the conning tower's tip slip beneath the waves. Looking forward, he saw the line of interns shrink in the distance. He had to get moving. Roscoe started to stand—but as soon as his feet made contact with the pier's gray surface, he slipped again. None of the other interns seemed to have this problem, he noticed, as they continued down the pier. What had they done differently?

Then, he realized, they had remembered their safety briefing. He hadn't.

Three weeks earlier, as the sub sailed down Delaware Bay, the interns were warned that they might need to go out on the ice. The video said it usually didn't happen, but "sometimes water loading schedules may

require disembarkation on Spigot's external pier." Roscoe knew just enough about Spigot to understand what this meant: By dropping their human cargo on this pier, the sub crews could ensure themselves enough time to flood their holds with precious water and head back north.

"In the unlikely event of a pier disembarkation, submarine crew members will distribute protective clothing," the video said. "Standard-issue intern footwear is not adequate for Antarctic conditions. For your safety, a compartment under your seat will unlock, providing ice-grips to attach to your shoes. These are essential for walking on the pier, which is often extremely slippery in winter." *It sure is*, Roscoe thought, noticing a slick sheen of ice on its surface.

A block of yellow light appeared beneath the red searchlight; the interns had reached the door, and it had opened for them. *Shit*, Roscoe thought. He had to get moving, or it would close, and he would be stuck out here. On another try, he managed to stand, take three steps, and fall again. The door closed; only the searchlight watched him now. He stood again and tried to run. He slipped on his first stride.

But this time, he didn't fall forward.

His foot slipped off the pier at the worst possible moment, and Roscoe felt gravity pull him to the right, toward a gap of open water between two ice sheets. In the split second before impact, he noticed white lights embedded along the pier about every meter, set into recesses several centimeters deep. A survival instinct, one he'd never used before, screamed *Handles!* Then, he hit the water.

The suit spared Roscoe a shock—but the numbing cold had a new weight behind it. The water wanted to get inside his suit. He knifed his left hand into the nearest recessed light and took several hard kicks to stay afloat, watching his breath cloud around the tiny bulb.

Roscoe lifted his right arm over his head, onto the pier surface just a few centimeters above the bulb. Just as he started to lift, a new pain shot up his right leg, and a new weight started to pull it down. His suit had sprung a leak.

He tried to lift himself over the pier's side, but the sedatives and cold had robbed him of the strength he needed. His leg grew heavier,

and the pain was beginning to fade. Maybe this was it—the Southern Ocean would do what he hadn't managed, just a week earlier, with a razor blade on his wrist.

He looked around—maybe in one last search for help, maybe just to get a look at his final resting place. And something caught his eye: Lagrange-2. StarCross had the one sure way to distribute electricity to a storm-scoured, fire-scorched planet—beaming it through the sky—and space stations at the two best points to do it. Gravitational forces held Lagrange-2 and its sister, Lagrange-1, at opposing orbital nodes. Up there, StarCross generated electricity from city-sized solar arrays and sent that power as microwave beams to any nation whose government had signed on the StarCross Updated Terms of Service. If any buyer took issue with those terms, their missiles would be destroyed by StarCross long before they traversed the million and a half klicks from Earth to either LaGrange station.

Those orbiting cities, and StarCross's mining and relay station on the Moon, also promised clean air and stable weather for anyone who worked hard enough.

For the second time in as many weeks, that promise saved Roscoe. He remembered the message he received just after slicing his left wrist, the message that told him he still had a path off this dying rock and up to that orbiting city. And that path ran down the pier toward the searchlight. His parents were counting on him to keep going. *You're it! Move!*

At last, adrenaline surged through him. Roscoe hauled himself back onto the pier, taking a few deep breaths before moving again. He didn't walk. Instead, he crawled—at first dripping wet, then stiff and crusted over as the water on his suit froze.

After two agonizing minutes, the searchlight led him to flat, solid ground. Roscoe wanted to kiss the gravel under his feet, but he didn't dare stop. His limbs and face were numb, except for the feeling of new weight on his ice-sheathed right leg and the exhaustion dragging down his upper eyelids. He ran uphill, fueled by the last of his adrenaline. Beneath the searchlight, he saw a shed with a single doorway, painted

with the light blue outline of a water droplet. He pounded on it with all the strength he had left.

If Roscoe had believed in God, he would have thanked Him when the door opened. He collapsed onto the floor, savoring the sudden warmth, looking up at a startled man wearing a bulletproof vest and a shoulder patch with the StarCross logo: three white stars and one blue droplet, placed at the corners of an invisible diamond kite. Roscoe's eyes rested on the lowest point, on the droplet representing Spigot. Then, the guard jerked back and, with a "What the hell?" reached for his holster.

Roscoe, still suited and on his back, raised his hands.

"I-I-I'm an int-t-t-ern. Came f-f-from th-th-the s-s-sub."

"Let's see some ID."

Roscoe tore open his suit front, pulled back the hood, and presented the tag hanging from a cord around his neck since he'd boarded the sub. The guard tapped it with his thick black wristband, then studied the shimmering screen that appeared in front of him. "Well, Roscoe Slake, why didn't you come in with the others?"

"F-f-f-forgot m-m-my ice-g-grips."

The security guard nodded, leaving his gun on his hip, and told Roscoe to strip. "Damn lucky you got here when you did," he said, handing him a foil blanket. "My shift's almost over. This door would've been unguarded for hours."

Roscoe couldn't say much more as two medics from Spigot's infirmary checked him for frostbite and gave him a set of dry clothes. As they led him down a staircase at the shed's rear, he heard the security guard talking to an unseen superior.

"Minor incident, boss. The intern coming in from the mid-Atlantic sub forgot his ice-grips. Almost got left out on the ice." He paused. "Yeah, profile says he was a pounder. Got the height for it. Guess we'll have to tell the sub crews to watch those ones more closely." There was a chuckle. "Or leave 'em. Probably not worth search and rescue."

Reaching the base of the stairs, Roscoe heard the guard sigh. "Why do they always send us the fuckups?"

Chapter 2

A familiar sound jolted Roscoe awake.

Spigot's alarm was the same StarCross-proprietary one—a mechanical whir, impossible to sleep to, accompanied by a flashing blue light—that had woken Roscoe every day of his decade at Granite Gorge Internship Academy. For a moment, he thought he was back in his dorm room. Then the ache in his feet reminded him of the night before—and his new home.

He rolled out of bed and traced the noise to a thick, black communications wristband hanging from a hook on the wall—identical to the one the guard had worn the night before. Roscoe slipped it onto his left wrist, grateful that it covered his scab. His Academy wristband had been featureless, but this one had two small external hooks. As soon as he noticed them, a tiny light flickered on, projecting a notebook-sized rectangle above his palm. Roscoe read the message:

> *Good morning, interns! Welcome to Spigot! Report to Auditorium at 1000 hours for orientation. Galley is open for breakfast—map of tunnels in your wristband.*

He pecked the home-screen icon on the floating panel and pulled up a map of Spigot's tunnel network—four wide, slanted lines intersected

by four, evenly-spaced narrower ones. His location was marked near the second wide tunnel from the left. The first two tunnels were highlighted white, while the other two were grayed out and marked "Restricted."

The map showed the stretch of narrow tunnel around Roscoe in light blue, while the areas across the wide main tunnel were pink. *Do they still keep genders separate down here?* he wondered.

Roscoe found a duffel bag of clothes beside his bed and got dressed, trying to recall anything from the night before when the medics had dragged him to his room. He didn't recognize the narrow hallway outside his door, or what lay at its end: the main tunnel, all bare, tan rock, lit by overhead LEDs, as wide as a six-lane highway, and already busy. Workers zipped past in both directions, driving squat electric carts. Their clothes and vehicles all had the light blue droplet outline he'd noticed on the exterior door. Looking down, Roscoe realized the same symbol was stitched on the breast of his jacket. He was a Spigot man now.

Roscoe followed his wristband down the tunnels to the galley, served himself SynCoffee and quinoa, and took a seat near the end of a long table. He recognized a few other interns from the submarine: Ana, from an academy in North Carolina; Darren, from Vermont; and Kevin, from Wisconsin. A wavy-haired, olive-skinned guy sat nearby, but Roscoe didn't know him. None of them were talking, and Roscoe understood why.

Small talk at any of StarCross's licensed Internship Academies was a minefield. Back at school, no one had wanted to let slip where they fell in the StarCross hierarchy—which Q-CAT percentile they'd fallen into or whether they'd been on compound. Whenever a conversation edged in on one of those topics, a mention of "StarCross Silence" sufficed to shut it down.

Roscoe wasn't complaining. After being called a "pounder" by the security asshole the previous night, Roscoe didn't want anyone else to know he had taken StarCross's now-banned aptitude-enhancing compound.

To avoid even having to invoke the Silence, he focused on his wristband screen and skimmed through StarCross News Network (SNN). In the "Top Stories" tab, he found news about elections, legislation, and treaties—the business most governments around the world still made a show of carrying on, and SNN still dutifully reported. None of it mattered. For a generation now, StarCross had controlled the only reliable sources of electricity and water—outer space and Antarctica, respectively. To secure these two vital commodities, virtually every country had subsumed its constitution, statutes, and long-held notions about a government's proper role to StarCross's Updated Terms of Service. In the name of complying with those terms, nuclear arsenals were taken off hair-trigger alert; military hardware was either turned against refugees or mothballed; and the top-secret technologies that would have gone toward space exploration and warfare were locked away—all ready to be exchanged for more of StarCross's water and energy.

For Roscoe's entire life, and most of his parents' lives, that water and energy had kept their refrigerator full, their showers hot, and their A/C running in Pennsylvania's swampy summers. StarCross water and energy had also backed two digital currencies—WECs and RECs—that seamlessly moved around the world, along with electricity, via the LaGrange stations. His parents and countless other small-scale generators had fed the flow, selling natural gas to a fuel cell near Scranton that beamed power up to LaGrange-2 for re-transmission. They had earned enough RECs to put Roscoe through Granite Gorge, but the LaGrange stations were the biggest producers and governments the biggest recipients. These days, governments didn't govern so much as grovel for StarCross's water and energy. That dynamic had earned politicians and bureaucrats around the world the pejorative nickname "govellers"—but they couldn't complain. StarCross had, after all, saved their citizenries from the water and energy shortages, warfare, and financial crises that had plagued the twenty-first century.

But StarCross hadn't ended the floods, heat waves, storms, and fires that Roscoe had grown up fearing—disasters he now checked for by tapping the SNN home screen's "Weather" tab. The parched grass of

the Great Plains and the tinderbox of dead rainforest in the Amazon continued to smolder, but Pennsylvania, for the moment, was safe. Roscoe felt his pulse slow. He knew their prefabricated home couldn't withstand the Northeast's ever-worsening floods, fires, and landslides. He also knew couldn't afford one of the new, ruggedized models built in StarCross's Marius Hills lunar manufacturing facility. If their current home was lost, the Updated Terms of Service would force them into a so-called Displaced Persons Center—what everyone back home called a Femaville. These centers were supposedly disaster-proof, with strategic siting and perimeter defenses, but conditions inside bred discontent that could only be contained by razor wire, guard towers, and strict limits on outside travel. His family had escaped that fate—for now.

Roscoe closed his wristband, slurped down the last of his SynCoffee, and reminded himself that *he* had to free his family from that fear by finding them a way off-world. *You're it*, he told himself again, trying not to think how his family had already blown two of StarCross's three routes off-world. His parents would never earn enough WECs or RECs to purchase Resident status on the Moon or one of the LaGrange stations. Most of the RECs they had earned siphoning natural gas had gone to his Granite Gorge tuition, which he had failed to leverage into a career-track position—and the family housing that came with it—off-world. The only chance left—to excel in his internship, earn a spot on StarCross's Leadership Training Program, and perform well enough there to secure an off-world posting with StarCross's Executive Staff—was now entirely in Roscoe's hands. He left the galley, letting his wrist guide him to the auditorium. *Better pay attention at orientation,* he told himself.

The auditorium lobby was also quiet. In front of the double doors, Roscoe saw one of StarCross's standard-dimension memorials to the Orbital Strike, the terrorist attack he'd learned all too much about this past year. He also saw a table and two lines of interns waiting in front of it. After a few minutes, it was his turn to face a copper-haired woman, wearing a lanyard. She sat next to a male intern with a buzz cut, also checking people in. They both looked a couple of years older than him, though they wore the same jackets as the other interns.

"Name?" she asked, barely looking up from her laptop.

"Roscoe Slake."

"Date of birth?"

"May 28, 2101."

"Happy belated birthday! Big two-two." Roscoe flinched, surprised not only by the reminder that he had turned twenty-two just two days ago—while drugged on a submarine under the Southern Ocean—but also by meeting someone this chipper. Her smile only grew as she looked up from her laptop. "You went to Granite Gorge?"

"Yeah."

"No way! Same!"

"Really? What year did you graduate?"

"In '21. Guess we never crossed paths. I'm Jen." She leaned across the table to shake Roscoe's hand. He only offered it after a quick look confirmed that the band still covered his scab. On her wristband-free hand was a bracelet—two beads shaped like black diamonds—that some of Granite Gorge's upper-class girls used to pilfer from the abandoned souvenir store in the academy building. "You're the first Gorgie I've met down here," she said, widening her green eyes.

"Really? The first one?"

Jen nodded. "Yep. Glad I can finally start a little alumni network down here."

Roscoe tried to remember if he had heard a "Jen" recognized at any of Granite Gorge's top-tenth award ceremonies; she was probably doing the same with him. The fact that neither of them had ever placed in the top tenth of the one percent on the quarterly Q-CAT exams probably helped explain why neither of them had gotten an off-world internship. "You're all checked in," Jen said as soon as Roscoe realized this. "Go on in and take a seat."

Roscoe found a seat and thought back to Granite Gorge: its cathedral-cabin main building originally built for skiers back when it still snowed in Pennsylvania, and the prefab-metal dorms, sunken into the slopes that had once been the easy ski runs. He never thought someone would smile about that place, especially when it hadn't gotten them off-world.

Looking around the auditorium, Roscoe counted fifty heads scattered beyond the front row. Everyone sat alone and adhered to the StarCross Silence. But in the front, nine interns sat clustered together. After a few minutes, Jen and the other intern who'd been checking them in hurried down the aisle to join this group.

The lights soon dimmed, and a screen appeared in front of them. First, StarCross's three-star, one-droplet logo came up. The graphic zoomed in on the droplet, then through its sky-blue outline to old stock footage from the mid-twenty-first century: parched riverbeds, empty reservoirs, dead crops.

"How could humanity keep feeding itself when rain no longer fell on its breadbaskets?" the narrator asked. "When every aquifer had been tapped, when rivers ran dry, brought destructive floods, or seethed with pollution? Desalination, pumping, and cloud seeding were all tried, and all failed. Then, in 2085, Rob Eatonson had an answer. Tap the last great freshwater source on Earth—Antarctica's glaciers and ice sheets—and export it around the world."

The soundtrack jumped an octave, and the video cut to a bearded, middle-aged man in a parka, safety vest, and hard hat, hunched over a machine's control panel. "Rob Eatonson's mining expertise helped StarCross source its minerals and metals from the Moon, rather than unreliable mines on Earth. In 2085, he took that expertise to the Taylor Valley."

The camera panned over a brown sea of gravel, threaded with snow and ice. On all sides, it sloped up toward bare, craggy peaks. This was his new home—hopefully just until he could get to either StarCross's Marius Hills facility or one of the LaGrange stations.

The video switched to a map of the valley: a banana-shaped groove running twenty miles from ice to ocean.

"The valley had no ice itself, but it had easy access to the Taylor and Ferrar Glaciers—and to the ocean. It was the perfect place for Eatonson's vision."

The video showed a tunnel-boring machine churning through rocks the same color as the valley floor. "Under Eatonson's direction, StarCross

engineers built the boldest drainage system in history. A network of tunnels to siphon the meltwater from beneath these mighty glaciers and slake humanity's thirst—and to house the hardworking employees who would run this operation."

"StarCross created a new unit of exchange, called the Water Equivalent Certificate, or WEC, to account for this water. Modeled on StarCross's energy accounting unit, the Renewable Energy Credit, it guarantees the bearer one thousand liters of fresh water."

Roscoe rolled his eyes. He'd known the difference between RECs and WECs since he was eight. He guessed Spigot showed this video to visiting StarCross Residents, whose families no longer needed to care about RECs and WECs, unless they ran some side business on-world as a hobby.

"The US government lent its resources to the effort." Roscoe rolled his eyes again. *Lent?* He knew enough about StarCross's Updated Terms of Service to know that when StarCross named its price for WECs or RECs, the govellers paid. "Applying an idea first developed to export Alaskan oil in the 1970s, the American military worked with StarCross engineers to blast out a deepwater port at the Taylor Valley's northeastern end. It retrofitted its naval submarines as undersea tankers, ensuring that Spigot's water could be securely transported around the world—at any time of year, in any weather condition."

The screen cut back to the logo of StarCross's predecessor, TriStar Energy: an equilateral triangle of three stars. "TriStar Energy's three space-based energy facilities had already made energy plentiful. As the first submarine tankers sailed north from Antarctica, the water shortages that had plagued humanity also came to an end. You might say these age-old challenges were star-crossed." As Roscoe rolled his eyes yet again, the three stars shifted a bit, and a blue droplet glinted into its place well below them on the StarCross logo. *If Spigot's so important, why doesn't your logo have the droplet closer to the damn stars?* Roscoe thought.

The music crescendoed, and the lights came up. At the podium stood a balding man, slightly stooped, with cheeks that sagged like a bulldog's. A circular, red-white-and-brown pin was fastened to his jacket. Jen and

the other interns from the front now stood beside him onstage. So did the buzz-cut intern who'd been sitting next to Jen out front.

"Hello everyone," said the man at the podium, his voice calm but commanding. "My name is Grei Jahnford, and I am celebrating my tenth year as the CEO of Spigot." Jahnford paused; Roscoe wondered if they were supposed to clap. After a few seconds of silence, Jahnford stretched his lips and bared his teeth. Roscoe couldn't tell if he was smiling or grimacing.

"I'm honored to welcome all of you to the Spigot family. As interns, you've been selected as some of the best and brightest in this year's internship class, and we need your skills now more than ever."

Now, Jen was the one to sneak in an eye roll; she finished it just as the CEO waved back to her and the other interns. They all looked a few years older than Roscoe. "With me are this year's Head Interns." Jen and the others gave a tentative wave. "They've just finished the two-year internship program you're beginning, and now they've entered StarCross's Leadership Training Program. With the exception of Trent here"—Jahnford gestured toward the intern who had sat with Jen at the table—"they will each be leading cohorts of you to get you situated during your first year in Antarctica. Welcome aboard, and let's bring water to a thirsty world."

Jen stepped up to the podium. "You've all had a long journey, so take the rest of the day off to get adjusted. Be in the galley at 0800 tomorrow to get your work assignments." That did it for orientation.

The interns rose from their seats and began to file out of the auditorium, maintaining the StarCross Silence. Roscoe followed his wristband's directions back to his room. On the way, he noticed a sign at a side tunnel entrance: This Tunnel for Male Interns Only. Violators Will Be Disciplined. *Looks like I was right about the separate-genders thing*, he thought.

His room was small, roughly two and a half meters by three meters, with a bed and drawers set into the wall. Roscoe opened the duffel bag he'd been given and unpacked the rest of his clothes. Nothing fancy—just a few pairs of synthetic pants, shirts, and jackets with Spigot's droplet

logo on the breast, along with a week's supply of socks, underwear, and some exercise shorts and T-shirts. A sign on the wall read: Dispose of Used Clothes in Wall Chute. Clean Clothes Your Size Will Be Returned to Your Room Every Friday.

Then, his wristband buzzed. Calling up the near-opaque screen, he saw a new message:

Welcome to Spigot, Roscoe Slake!

We are excited to have your help with our mission of bringing water to a thirsty world. Please read this message as it contains important information about your cohort and job assignment.

Your cohort leader is: JEN DOIL

Your cohort leader, an intern in the StarCross Leadership Training Program, will lead you and a group of four other interns in regular discussions and social activities during your first year at Spigot. They will be in touch soon with more information.

Your job assignment is: ARCHIVES.

This job is vital to Spigot's mission of bringing water to a thirsty world. You will gain vital experience in this position over the next two years. At the end of this period, you will have the option of either pursuing a career-track position in the ARCHIVES division or extending your internship by two years and entering the StarCross Leadership Training Program, which can open up new opportunities for StarCross leadership positions and transfers to other StarCross facilities later in your career.

Roscoe already knew he'd go for the Leadership Training Program. He'd made that choice a week ago, before his wrist had even stopped bleeding.

He scrolled through a few more paragraphs of platitudes probably cranked out by some algorithm, then closed his eyes. Two years of interning here, then two more in the leadership training program, and *then*, maybe, he'd get his shot off-world.

A dull pain had sprouted in the center of his brain, and thoughts of his father pointing toward Lagrange-2 filled his mind. Homesickness and headaches—it was the same every time he ran out of compound. But this time, there would be no more pills. *Time to face withdrawal*, Roscoe thought, grateful he didn't have a roommate.

Even so, he had already been marked as a compounder.

"Hey, you got any extra doses?"

Roscoe looked up from his second SynCoffee-and-quinoa breakfast in Spigot's galley. The wavy-haired guy he had noticed the day before was sitting across from him, asking for drugs in an Australian accent.

After a long silence, during which Roscoe wondered what had given him away as a "pounder," the Aussie spoke again. "I got a compound for logic and geospatial reasoning," he said, snorting. "Wasn't enough to get me off-world."

Roscoe sighed and shook his head. "Mine was a coding-heavy formula. Wasn't enough for me either. Don't have any doses left. How bad are your headaches?"

"Had worse. I'll muddle through. Really wish StarCross would let us taper after graduation rather than cut us off cold."

For the first time in Antarctica, Roscoe smiled. It was a relief to find someone in the same pharmacological bind as him—even if the compound hadn't stopped this guy from growing a dozen centimeters taller than him. When the intern extended his hand, Roscoe noticed his wrists were unmarked by suicide attempts.

"Hamza," he said.

"Roscoe."

As they shook hands, Roscoe couldn't quite place where Hamza was from—his skin and hair suggested South Asian parents, but his broad nose and thick lips seemed to point somewhere else. Roscoe spotted, on a cord around his neck, a wooden carving no bigger than two knuckles. A stylized face with almond-shaped eyes inside concentric curves stared back at him. Then Hamza leaned forward, and it dipped into his collar.

He pointed toward the gate at the galley entrance. "Think those pills they gave us will make up for it?"

When Roscoe arrived, a small hatch in the tall black box beside it had opened, dispensing a gray pill stamped T3. *Swallow*, the screen instructed. *Daily T3 doses are essential to prevent winter-over syndrome.* Once Roscoe took the pill, the galley opened.

Roscoe shrugged, uncertain what T3 was or if it resembled the compound at all.

The ceiling lights suddenly flashed blue, and everyone fell silent. Roscoe heard a disembodied voice and saw Jen, the head intern he'd met the day before, speaking into a microphone.

"Good morning, interns!" she said with vigor likely fueled by several cups of SynCoffee. "Time to head to work! Last night you should have received a message on your wristbands with your work assignment."

Roscoe and Hamza joined their new colleagues heading toward the funnel of the galley door. "Where are you working?" Roscoe asked.

"Drone Operations!" Hamza said, suddenly seeming to forget compound withdrawal. "You?"

"Archives."

"Huh," Hamza replied. "I wonder what they do there."

Roscoe shrugged again. Since last night, he hadn't figured out how Archives would help Spigot find water.

Chapter 3

He still wasn't sure by the end of the day.

Roscoe's wristband had directed him to a long, low room. A woman just a few centimeters taller than him answered the door. She looked at him through thick, circular glasses beneath a gray-streaked pageboy haircut. "Roscoe?" she asked, voice high and lilting.

"Yep."

"Karla Marmolada." They shook hands. "Welcome to the Archives."

Karla led him into a hall as wide as Spigot's main thoroughfare, and nearly half a kilometer long. Both walls were lined with grids of filing cabinets, with a row of standalone cabinets running along one side and two desks positioned near the entrance. Ceiling lamps bathed everything in warm amber. Karla swept her arm over the tunnel. "Everything you ever wanted to know about Antarctica—and lots you probably didn't."

Roscoe looked down the cavernous hall. "This is all about Antarctica?"

"It is indeed. From the first two hundred years or so of Antarctic exploration."

"What kind of stuff?"

"Depends on the era," Karla said. "From the eighteenth century, we mostly get whalers, sealers, and merchant vessels—ship captains' logs, sailors' diaries, shipping manifests, insurance records, things like that.

Not too much of it. But in the nineteenth century, then things started piling up."

Karla rapped her knuckles on a leather-bound volume lying on her desk. Roscoe read the spine: "Logbook of Capt. Josiah Creesey, S.S. Flying Cloud, 1851." A chip and barcode had been pasted on its spine.

"Where did we get this?"

"Let's see." Karla set the book down, tapped her wristband to the chip, and squinted through her glasses. "Looks like the old Library of Congress sent it to us when they moved to Duluth."

"Governments send us these?"

"That's right. We confirm they've purged every listing from the old World Wide Web and other databases. Under the Updated Terms of Service, they'll also have to ban all duplicates and promise to destroy any that turn up. Then they send the physical documents here. We process and look through them for anything that might help Spigot produce more water."

"How do we know when something in these books will help produce water?"

"We don't. We just pull certain information: latitudes, longitudes, weather conditions, geological observations, and various keywords. An algorithm looks through it, decides how useful it will be, then tells us how many WECs to give the sender." She slapped her palms together as if she had just swept a room spotless. "All spelled out in StarCross's Updated Terms of Service."

Karla picked up Creesey's logbook and started flipping through the pages. "This captain went around Cape Horn. Perhaps my ancestors saw his ship pass Chile. Because they didn't get too far south, this logbook won't help find water down here. We'll probably only give the gringos a WEC or two for it." With a sad smile, Karla closed the logbook. "To be valuable, it has to come from the glaciers themselves. How high was this ice in the past? How deep were the crevasses? Those are the details that will help draw fresh water from the ice. But StarCross still sees some worth in the Southern Ocean, so we have to review those records too."

"So governments trade their historical records for WECs ... and we use them to find more water?"

"Well, not us," Karla said, waving her finger between them. "Everything we collect goes to Data Processing, which uses it to figure out where Spigot should map or tunnel next."

Roscoe felt a strange thrill. History was the one Academy subject he had ever really enjoyed—even after he had failed to get off-world by offering a new take on StarCross history in his senior capstone thesis. Now, in this cave under a frozen wasteland, history was useful for something—and might still be his ticket off-world. "So records from hundreds of years ago can help Spigot find water?"

She shook her head. "Not really. Since there's plenty of ice left at the inland end of Taylor Valley, the folks in Data Processing mostly want newer, twenty-first-century research on local geology and drainage. Most of that's digital and gets beamed straight to them. They probably won't touch this eighteen hundreds stuff for a long time, if ever."

The thrill fizzled. "So we just sit on it."

"Right. As long as we have it, that means the wildcatters up on the ice cap or the peninsula don't. Every bit of knowledge we lock up keeps future WECs out of someone else's hands." Another rueful smile. "Or at the very least, it creates a job for humanities people like you and me. They might not need us in space, but we're still good for something down here."

So it's that obvious, Roscoe thought. He'd scored ninety-eighth percentile on the lightly weighted humanities portion of StarCross's final placement exam, while failing to crack eighty-fifth on coding and logic. He didn't even want to think about his leadership aptitude score.

And that had all been with the compound, which was no longer StarCross-approved and not available down here.

Roscoe swallowed hard and blinked fast, just in case any tears emerged. Karla must have noticed. "If it makes you feel any better," his boss said, "I quit my Library Science PhD program to take this job. At least this came with guaranteed housing."

"You didn't have to go through the internship program?" Roscoe asked.

"No, it was a little looser in those days. StarCross sometimes hired people cold. That was before they realized they needed the academies and internships to brainwash people." Roscoe forced a smile. It must have been a bad one because Karla looked away and led him to the two desks. "Anyway, let's get to work."

Roscoe now saw that the Archives' two desks were mounted on rails running parallel to the stacks. "The one good thing about working for mining engineers is that they know how to make an underground workspace comfortable when they want."

Karla settled into one of the desks and demonstrated its controls, gliding smoothly along the rails. Stopping at a section, she pressed a button to select and open a case It extended from the wall to to bring its books and documents flush with the desktop. The desk's reading lamp, keyboard, monitor, and barcode-pasting equipment were all within easy reach of her slender frame.

Roscoe took a seat at the other desk, mimicking her motions as he got a feel for the system, testing the smooth glide of the controls and the way the case extended into place. "Looks like you've got it," Karla said. "We've come a long way from the old coal mines, no?"

He nodded, remembering the Mining portion of Granite Gorge's Engineering Fundamentals course, where he had learned how StarCross extracted minerals from the lunar surface—and how he could maintain the robots that did the work. "StarCross doesn't send people to the Marius Hills mining colony so they can slap on a space suit and swing a pickax," their nicotine-starved teacher had shouted at the class after a particularly bad quiz. "It has robots do that shit, and it only wants people who can service those robots. If you think they'll take you with grades like these, you're out of your ever-loving minds!"

The thought that he might be out of his "ever-loving mind" to still believe he could make it to the Moon almost tipped Roscoe toward wanting to slit his wrists again—but then the memory that sparked that thought pulled him back. "Hang on," he said to Karla. "Can't AI do this stuff?"

Karla shook her head. "It could, but it makes more sense for people to do it."

"Why?"

"You can train AI to recognize one person's handwriting, no problem. But we're dealing with stuff from hundreds of different writers, sometimes multiple writers in the same logbook. When it comes to making sense of all that, the Equation still favors humans." She smiled with pride.

"The what?"

Karla lowered her glasses and looked at him. "The Equation. They don't talk about that up north?"

Roscoe shook his head.

"It's an algorithm," she explained. "AI needs computers, and computers need energy—and water for cooling. The Equation helps StarCross decide whether it's more profitable to use AI for a given task or to have humans do it, selling the energy AI would consume as RECs and the cooling water as WECs."

"And the Equation says humans are better for doing this?"

Karla nodded. "At least so far. And as long as it does, they need us down here." She smiled again as she sat at her own desk. "I wouldn't worry if I were you. They just added an intern position. That's a four-year investment right there. You're probably fine."

Roscoe nodded again. He pulled a folder from the box sitting on his desk, while mulling over this unspoken caveat to the promise StarCross had made to every Internship Academy family. *You may not be connected to anyone with a big enough Discretionary Account to get you off-world, but we can still train your kids for jobs up there—unless some secret Equation decides that it's better business for a robot to do it.*

To keep his view of StarCross from curdling any more, Roscoe turned his focus to some of the first words written in these latitudes. Then Karla spoke again. "Amazing, no?"

When Roscoe looked up, she continued. "These men wrote with quills, on sailing ships. And they outsmarted the best machines we have today."

Chapter 4

Chatham Dockyard
England
September 1839

The note reached Yule as he finished his breakfast: "Chart-boxes ready. Report to Commissioner's House."

Second Master Henry Braddick Yule complied at once. He stepped off the H.M.S. *Tartar*, the old frigate where he had been lodged, and followed the River Medway to the House.

Chatham was just starting to wake up. Yule saw the day's first puffs of smoke rise from the foundry and heard workers shouting inside the ropery as they prepared the rigging for Her Majesty's Ships. It was nothing like the old days, the older officers said. The dockyard had been working below capacity for decades, ever since Nelson drove Napoleon's fleet from the seas.

To justify his post, Chatham's current Commissioner had lavished attention on the *Erebus* and *Terror*, readying them for the voyage of discovery that Yule would soon join. The Commissioner greeted the Second Master himself in the brick mansion's foyer.

"Good morning, Master Yule. May I present Mister John Walker, engraver for the Hydrographic Office, just arrived from London."

A balding man with mutton-chop whiskers shook Yule's hand. "Much obliged, Master Yule. The chart-boxes are ready for placement aboard ship." Two padlocked trunks sat beside him on the floor, one marked H.M.S. Erebus and the other H.M.S. Terror.

Walker took the handle on one end of *Erebus*'s box, and Yule took the other. For the first time, a chart-box's weight unnerved him. This trunk held charts of every reef, shoal, and coastline between England and Van Dieman's Land, the island just south of Australia. As second master on the *Erebus*, Yule would have to navigate the ship through them—and through whatever unknown hazards lay between Van Dieman's Land and the *Erebus*'s final destination: the South Magnetic Pole. He would also have to collect soundings and surveys that would let more of Her Majesty's Ships follow in her wake.

"Your surveying skills are legend at the Hydrographic Office," Walker told Yule. "The plainest, most digestible angle-books and remark-books we've yet seen."

"I hope I can deliver more," Yule replied, almost feeling the trunk grow heavier as they carried it across the Commissioner's front yard.

"We all wanted you to be named First Master on this voyage, but the Admiralty insisted on Tucker. Second Master was the best we could do."

"Well, I certainly appreciate the effort." Yule knew how the Admiralty and Hydrographic Office clashed over the choice of masters on surveying voyages. On this one, the Admiralty had prevailed. It had won the appointment of Charles Tucker—whose family had spread its breweries over several Parliamentary districts—as First Master. Having inherited little beside his father's endless stories of Trafalgar, Yule would have to settle for service under Tucker as the ship's Second Master.

Those stories had real value, Yule told himself, as he and Walker carried the trunk through the dockyards and past the workers. When he shared this voyage's route with his father, he learned he could return to England with enough wealth to win the Admiralty's favor.

However, a return to England was no sure thing.

"She's no *Victory*," Walker said as they hauled the chart-box aboard the *Erebus*, "but she's tough, and that's what you'll need."

"Indeed," Yule said. The *Erebus* was no ship of the line, one of the great battleships like the one Yule's father had served aboard at Trafalgar. She was a bomb vessel, built short and squat to bear the recoil from launching a thirteen-inch mortar shell over an enemy's ramparts. Her heavy artillery had been removed, but the original oak hull remained. Chatham's workers had spent the summer encasing it in extra plank, felt, and copper—enough, it was hoped, to shield the *Erebus* from the ice and uncertainties of the southern seas.

The Admiralty would expose the ship's crew to greater risks, but just a few men at a time. Smaller boats had been lashed to *Erebus*'s deck. These crafts would let the crew survey and plant the Union Jack on distant shores while the *Erebus* and *Terror* bobbed at a safe distance.

Yule led Walker below decks, helping the engraver ease the chart-box down the ladder. They carried the trunk to the ship's Great Cabin, where Captain James Clark Ross sat at his desk.

He wore a look of annoyance when Yule entered, but his expression sweetened when Walker followed him into the cabin. "Mister Walker! Here with our charts, I see?"

"Indeed, Captain Ross," the engraver said, "and I look forward to revising them upon your return."

"We shall bring you much work. Magnetic observations from here to Australia, and surveys of whatever shores and seas await us from there to the Pole."

"Be sure to attend to those observations," Walker said, with a gentle smile and wag of his finger. "Having already planted the flag on one magnetic pole, you must be eager to claim the other. But all those measurements in between will let us calibrate the magnetic model and save more of England's sons from the seas."

Ross nodded gravely. "Indeed. A tilt of the compass needle can make the difference between hitting a reef and clearing it. Right, Master Yule?"

Before Yule could answer, Ross stood and led Walker to the windows set into the cabin's aft wall. Both men looked into the oily river. "With the help of Providence," Ross said, "we shall soon be able to tell a ship's

location by compass bearing alone. No more need for clear skies and a chronometer." At present, Yule needed both to find a ship's longitude.

Walker nodded. "The sea's perils are receding fast." He turned to Ross and winked. "Think sailors will stop pouring good rum overboard or hunting for Jonahs?"

Ross smiled and shook his head. "We can hope, but a captain must allow his men their superstitions." He turned from the window, his voice tart again.

"Master Yule, help Mister Walker bring the *Terror* its chart-box, then report back here. We must prepare ourselves for the Lords Commissioners of the Admiralty."

"Aye, Captain."

Yule led Walker off the *Erebus* and back to the Commissioner's House.

"He's a genial one, that's for sure," the mapmaker said. "That warmth will doubtless prove useful on the voyage south."

Yule nodded but said nothing. He had seen Ross soften his voice and brighten his smile around superiors from the Admiralty or civilians from the Hydrographic Office. He dreaded the prospect of two years or more under this captain without these calming influences.

They hauled the second chart-box to the *Terror*, leaving it in the hands of Captain Edward Crozier and First Lieutenant Archibald McMurdo. As Walker departed for London, Yule returned to the *Erebus*.

He found Ross on the top deck, and all of the *Erebus*'s officers and able seamen lined up at attention as the captain led three men down the ship. Yule winced. The Lords Commissioners of the Admiralty had arrived sooner than expected, and Ross had begun the review without him. The officers' uniforms were all resplendent; Yule would look disheveled next to them. Should he wait out of sight until the review was over? No; better a ship with a rumpled Second Master than a ship with no Second at all. He smoothed his coat and hair as best he could, then took his place beside the other officers.

Ross led the Lords Commissioners down the line, introducing them to each officer. As Yule took his place, Ross introduced them to the ship's assistant surgeon and youngest officer, Joseph Dalton Hooker.

If not for his muttonchop whiskers, Hooker would have struck Yule as a boy of twelve.

"—could identify mosses by sight at age six, from what I'm told." Ross told the Lords Commissioners as Hooker blushed. "Comes recommended from the Royal Society."

The First Lord of the Admiralty shook the assistant surgeon's hand. "We wish you many new discoveries on your voyage south, Doctor Hooker. But do be sure to place the health of the ship's crew first."

"Oh, I shall make sure of that."

The reply came not from Hooker, but from the man between him and Yule. Ross glared but kept his tone warm. "And this is our Ship's Surgeon, Robert McCormick. Joined Fitzroy's voyage on the *Beagle*." The First Lord of the Admiralty winked as he shook McCormick's hand. "Do keep an eye on Doctor Hooker. These young surgeons are known to shake the first time they wield the saw."

"I shall do my best to steady him, my Lord." Yule heard a hint of an Irish accent.

Yule's turn had come. Ross shot him another quick glare before he spoke. "May I present our Second Master, Henry Braddick Yule. Please pardon his appearance and placement in line. He came right from delivering the *Terror*'s chart-box."

"Master Yule. Was your father a lieutenant at Trafalgar by chance?"

"Aye, my Lord. He served aboard the *Victory*."

"Well, I hope you should uphold your family name."

"I shall do my best, sir." To Yule's relief, Ross seemed eager to move them on from his ill-dressed navigator.

Yule stood at attention, sweating in the rising sun as Ross introduced the Lords Commissioners to the remaining officers, then led them around the top deck, giving them all too much detail about each of the expedition's whaleboats. Finally, the Lords Commissioners returned to a spot ten paces before the ship's crew, facing Ross. The Earl of Minto drew a thick envelope from his pocket and unsealed it. In time-honored tradition, he read the ship's orders in a reedy voice.

"Whereas it has been represented to us that the science of magnetism may be essentially improved by an extensive series of observations—" Yule listened as the Earl instructed the *Erebus* and *Terror* to meander south down the Atlantic and east toward Australia, stopping to survey coasts, collect mineral, animal and botanical specimens, and take the all-important magnetic measurements at several ports and islands along the way. Yule smiled at the mention of one of these stops: Kerguelen Island, the knob of ice and rock Cook had found far southeast of Cape Town, where so many of Yule's hopes now lay.

His smile faded when the Earl instructed them to sail south from Van Dieman's Land, the island just below Australia, "—in order to determine the position of the magnetic pole, and even to attain to it if possible, which it is hoped to be one of the most remarkable and creditable results of this expedition. However," the Earl continued, "you are to use your best endeavors to withdraw from the high latitudes in time to prevent the ships being beset with ice."

Yule forgot the late-summer heat, and his own hopes for this voyage. Cook had been the first to venture below the Antarctic Circle, sixty-six degrees of latitude south, more than sixty years before. He had returned telling of icebergs higher and longer than any seen in the Arctic—but also insisting that the mythical southern continent, Terra Australis, could only be a myth. Yet, many still believed. The sealers and whalers who followed in Cook's wake had found many islands south of Tierra del Fuego—and glimpsed peaks and coastlines on the horizon. Was this a southern continent? Had Cook been wrong? None had dared to investigate. Once a ship filled its hull with seal pelts or whale oil, it left to escape the horrors of a southern winter.

Yule's captain had just been tasked with avoiding those hazards—but also with finding the South Magnetic Pole. Yule wondered which order Ross valued more.

The Earl's next instruction turned Yule from that dark thought back to his hopes for this voyage. He told the crews that, "in the event of England being involved with any other power during your absence, you are clearly to understand that you are not to commit any hostile act

whatever." This voyage promised none of the great sea fights that had built careers like his father's, no chance for more of the prize money that had paid for him to learn navigation at the Upper School of Greenwich. No matter, Yule had a different plan for advancement and wealth at sea, and it lay at their ship's scheduled stop in the Kerguelens—and in a years-old letter at the bottom of his trunk.

"On your return to England," the Earl continued, "you are forthwith to repair to this office in order to lay before us a full account of your proceedings, taking care before you leave the ship to demand from the officers the logs and journals they had kept, and the charts, drawings, and observations which they had made and which are all to be sealed up."

Yule and First Master Tucker would collect many of those observations. They would use the latest theodolites and sextants to survey each port in their angle-books. They would fill their remark-books with depth soundings and details of life at sea. All of this would let the Hydrographic Office update its charts and maps of these locales upon the expedition's return to England.

Yule thought that was the end of it, but the Earl had one final order. "You are to endeavor to preserve all such specimens of the animal, vegetable, and mineral kingdoms as in the course of the voyage may have been collected by any person on board either of the ships."

With that, the Earl closed the letter. "Do you accept, Captain Ross?"

"Aye, my Lord." Ross saluted. The Earl handed Ross his instructions. "Then may Providence guide your voyage." The official ceremony had ended, and the Earl shook Ross's hand. "God speed."

With the Lords Commissioners of the Admiralty departed and each ship's chart-box delivered, Yule had no further duties for the day. He headed into town for a few bottles of Madeira; after all, a long voyage lay ahead. He passed two dockhands near the base of the gangway.

"Think they'll make it?" he heard one ask. "The South Magnetic Pole."

"Wouldn't bet on it, no matter how many mouthfuls of rum they toss overboard. Heard plenty o' nightmares about those parts."

"Such as?" asked the first hand. Yule slowed his pace to eavesdrop.

"Well, there was a chap at the pub once—a sealer," the second dockhand continued. "Way he put it was, 'Below forty degrees south there is no law. Below fifty degrees there is no God.'"