Catacombs of Callisto

Hammer McCracken

CHAPTER ONE FOREIGN MATTER - VAT SOLDIERS OF JUPITER

The mosquito had no business being in the clouds of Jupiter.

This was clear even to the mosquito, though clarity was not among its better qualities. It knew three things: it was cold, it was hungry, and the universe had become much too large.

Around it rolled an ocher infinity, cloud folding over cloud in bruised bands of cream, rust, and dirty yellow. The wind carried it sideways at two hundred miles an hour, then down, then sideways in a different direction, with the casual malice of weather that could misplace a small moon. Far below, pressure kneaded hydrogen into heavier and less hospitable forms. Far above, sunlight filtered through ammonia haze as a dim, poisonous glow. The mosquito possessed no vocabulary for any of this. Its opinion was simply that outdoors had gotten out of hand.

It could not remember how it had arrived there. Mosquitoes are poor historians. It retained a warm impression of skin, a delicious pressure in its abdomen, and the aggrieved slap of a hand that had missed by less than a millimeter. Whose skin it had pierced and what curious cargo that blood contained, were matters beyond both its memory and its professional concern.

Ahead, a floating hab emerged from the cloud like a moon but one built out of plastic and steel instead of ice and rock. Like a moon it was a sphere nearly thirty kilometers across. Unlike a moon its metal hide was stained by weather and patched in shades of government gray. Tether cables vanished upward toward kilometer-wide kites riding the violent winds and downward toward anchors sunk in the denser depths. The whole arrangement kept fifteen million people (approximately per hab) at roughly the same altitude and gave every one of them the comforting belief that someone else understood how and why.

A maintenance vent on the hab's flank had lost three louvers and most of its warning stencil. Warm air leaked from it. The mosquito turned toward warmth with the desperation of a dying thing.

It crossed the final yard under its own power. Then the vent inhaled.

The mosquito shot through a broken grille, ricocheted off a filter frame last serviced forty-one years earlier, passed between fan blades with a clearance too small to be called luck by anyone who understood statistics and entered the hab.

Inside was weather of a more municipal kind.

This hab, like most habs, was mostly hollow. Halfway through the enormous sphere, a disk-shaped platform stretched from wall to wall. It carried a city of rounded towers, chrome diners, factory blocks, black and white marquees, military offices and apartment flats arranged according to a civic plan that had once been optimistic and was now merely meh. The disk could gimbal five degrees in any direction while the sphere pitched in Jupiter's winds. Around its rim, water thundered through colossal pipes, serving as a gyroscope and as an explanation city officials repeated when federal officials asked why the floor moved.

Above the city arched the empty upper hemisphere. Clouds formed beneath the roof and rained on the boulevards. Propeller aircraft plied the open air between buildings while silver blimps nosed along designated air corridors. Millions of incandescent spotlights studded the inner shell. They brightened in sequence each morning and dimmed each evening, producing a twenty-four-hour day at tremendous electrical expense. At the moment it was late afternoon in the western lighting district and early morning three miles east due to a stuck relay.

Below the platform, upside-down buildings hung toward darkness. Their foundations clung to the underside of the city and their rooftops pointed at a black gulf terminating, thousands of feet down, in the hab's ballast sea. That sea was also the drinking supply and last resort biome for abandoned and dangerous aquatic pets. Official pamphlets mentioned these facts in asterisked footnotes.

The mosquito flew through warm rain, over the roof of a bus terminal, beneath a propeller mail plane and into the factory district. Chimneys and cooling stacks crowded there beneath signs proclaiming VICTORY THRU PRODUCTION and EVERY SOLDIER STEPS TOWARD PEACE. A third sign had lost several letters and now promised VERY SOLDIER S WAR ACE.

The insect followed heat through another vent. This one was supposed to be sealed because the room beyond contained flammable solvent vapor. Someone had wedged it open with an rusty tank of oxygen.

It entered Soldier Fabrication Plant 88-B during second shift.

The plant was a long iron cathedral dedicated to mass-produced infantry. Assembly lines crossed beneath smoky rafters. Chains clattered, pulleys squealed, pumps coughed and short rotund workers rolled steel carts through aisles striped with hazard paint. Everyone smoked. The people nearest the NO SMOKING signs smoked with

particular enthusiasm, because rules were suggestions by other people who had no clue.

Along the first line lay open molds: two-piece impressions of adult men or women, broad-shouldered, thick-boned, and built to tolerate the radiation and gravity around Jupiter. A worker aimed a spray gun into each half and coated the interior with pearly non-stick film. She moved from boots to scalp, humming the Vacuum Corps hymn and missing the left ear on every fourth mold because the hose tugged at that point in her reach.

The mosquito descended toward the gleam of fresh like film. It had found warmth, still air and a pale concavity shaped rather like shelter. It landed inside the upper half of mold B-7331, just behind the right shoulder blade.

The non-stick surface held it fast.

This struck the mosquito as misleading. It pulled until one leg came off. It buzzed until the film closed over its feet. The warm blood in its abdomen cooled. Its last act was to drive its proboscis uselessly into government-certified polymer, and its last thought, if it had one, was that the indoors had also gotten out of hand.

Then it died.

The line moved.

A second worker lifted the matching half of B-7331 and clamped it down. A third struck the clamps with a rubber mallet whether they needed it or not. At the injection station, a nozzle entered the narrow channel at the crown of the mold and pumped in eighty-seven gallons of pink bio-goo. The goo flowed around the dead mosquito, dissolved what it could, sampled what it could not and accepted a set of biological instructions no military procurement officer had anticipated.

Bio-goo came from ancient machines. The Jupiterians could replace valves, hoses, bearings, and any component that could be understood by hitting it with a wrench. They could not reproduce the machines themselves. Deep inside their cabinets, mechanisms no one had opened in centuries converted feedstock into programmable living matter. According to surviving labels, the material was meant to metamorphosize the way a caterpillar did inside a cocoon. According to plant workers, it made soldiers.

Normally the goo read its military template, sorted its cells into tissues, and constructed one fully grown enlisted man from the soles upward. It

laid calcium scaffolds for bones, braided muscle over them, grew organs in the protected center, wired nerves, and saved the brain for last because management had once concluded that this reduced complaints. It randomized skin color among six approved regulatory categories: white, black, red, yellow, brown and tan. Occasionally it produced blue, green, or patchwork soldiers. These were marked for immediate recycling, unless they objected with sufficient violence, in which case the overworked shift foreman generally found them fit for duty.

B-7331 was assigned tan.

The mosquito confused the matter. Its DNA did not transform B-7331 into a giant mosquito. That would have been straightforward, and therefore unlikely. Instead, the goo treated fragments of insect code as damaged annotations to the human template. It started repairs, repaired the repairs, abandoned both and built compensating systems around errors that no longer existed. B-7331 developed an unusually brisk clotting response, a heightened sensitivity to carbon dioxide, and two vestigial muscles behind his shoulder blades that would puzzle doctors for the rest of his life. His immune system emerged with the belligerent confidence of a customs inspector who had misplaced the list of prohibited goods.

The nozzle withdrew. A worker thumbed a tiny plastic plug into the opening at the top of the mold. The plug was meant to remain in the finished soldier's scalp for life. It permitted later access for medicine, emergency pressure relief, disciplinary rinsing and several classified procedures whose instruction cards had been lost.

On the paper ticket tied to the mold, the worker stamped B-7331. No name. Names were issued later, along with boots, discipline and the opportunity to die for Jupiter.

For the moment, Bo Bovastein was a serial number full of contaminated DNA stew.

Two workers heaved B-7331 onto a handcart. One complained that it sloshed. The other said they all sloshed. To settle the issue they leaned close, listened and heard a faint internal gurgling caused by a trapped bubble passing through the forming pulmonary artery. Neither had heard a mold gurgle before.

They marked it NORMAL and wheeled it to incubation.

The incubator hall rose twenty molds high. Iron catwalks crossed racks of thermal cabinets, feed manifolds, waste pipes and gauges with

quivering needles.

A green tube entered each mold at one nipple site carrying nutrients. A yellow tube left through the other carrying metabolic waste. Special filter adapters allowed the yellow line from one soldier to feed the green line of the next after removing everything the quartermaster considered unhelpful. This saved plumbing, money, and the moral burden of describing the arrangement accurately.

For two months the molds were thermally cycled. Heat accelerated tissue growth; cooling phases guided differentiation and prevented the contents from becoming, in the language of the maintenance manual, 'overly explosive.' Workers climbed the catwalks around the clock, checking temperature dials and squeezing tubes for blockages. Thermal cyclers failed constantly. Feed lines split. Filters clogged. The racks groaned whenever the hab tilted.

B-7331's incubator had no correct temperature.

At first its thermostat held five degrees too cold. A mechanic struck the housing and made it eleven degrees too hot. He struck it again and broke the needle off the gauge. For nine days, the night shift judged B-7331's temperature by laying a palm on the cabinet and saying things like, “Feels warmlike.” During this period Bo's left kidney matured twice, noticed the duplication and absorbed the spare.

The green nutrient line kinked on day twelve. A worker named Midge discovered it after choosing B-7331 in the weekly growth pool. She gave him a second line and a third for luck. Her rival, Dottle, removed one and used it to improve the prospects of C-2094. Midge retaliated by reversing C-2094's waste adapter. This led to an explosion on Rack Nine and a revised betting sheet.

Of course the wagering was not officially sanctioned. Officially, workers were encouraged to take a constructive interest in product quality. Unofficially, odds were chalked on every boiler casing in the building. Bets covered skin color, final weight, first word, number of fingers, sulfur odor, time required to escape the cocoon and whether a soldier would sit up, salute, attack, sing, or expire. A clean hatch paid poorly. A blue soldier paid eight to one. A soldier with a usable extra limb could settle a mortgage.

B-7331 attracted attention because trouble accumulated around him without quite becoming failure.

On day nineteen the hab pitched four degrees during a storm. His

cabinet latch opened, and the mold slid out, fell one level, struck a railing, rotated end over end, and landed upright in a cart of clean filters. No developing soldier had a recognized head at that stage, yet Bo acquired a lifelong dislike of doing things the right way.

On day twenty-six a waste shunt burst and sprayed three racks with warm yellow fluid. B-7331 was knocked over and lay facedown for six hours. His forming lungs compressed against the front of the mold. In response, the goo reinforced the ribs and slightly flattened his nose. This would later be described on his personnel file as an expression of determination.

On day thirty-three, Dottle put out a cigarette by slipping it through B-7331's scalp port. This was against plant regulations, principally because cigarettes were expensive. The ember dropped into living material, burned a narrow channel beside the skull and should have caused catastrophic infection. Bo's confused immune system encased the ash in a pearl of calcium and placed it behind his left ear. For years afterward, medical X-rays would be interpreted as evidence of secret intelligence equipment. Bo would never receive any intelligence from it.

By day thirty-nine, B-7331 had survived a coolant leak, two power outages, a falling wrench, underfeeding, overfeeding and a clerical order sending him to the sulfur trench. The trench crew rejected him because he had not yet been opened and was therefore too heavy. Their foreman cited them for initiative.

This initiative saved Bo Bovastein for the first time anyone documented.

During the final three weeks, the molds were winched down from incubation with block and tackle and carted to the training rooms. These were long, low chambers lined with reel-to-reel tape decks the size of wardrobes. Each deck carried one hundred quarter-inch sockets. Workers fixed low-voltage electrode arrays around the head of every mold, plugged the leads into the machines, loaded a tape, and pressed PLAY.

The electrodes fed full sensory experience into the developing brains through five advertised brain-wave frequencies: Alpha, Beta, Gamma, Delta and Theta. The science was precise. The labels on the sockets were handwritten.

The daytime tapes taught language, arithmetic, weapons, obedience, personal hygiene, elementary spacecraft repair, advanced spacecraft blame assignment and a complete fabricated childhood. Long ago, each soldier had received an individualized past. Time, tape decay and budget

consolidation reduced these to one surviving childhood copied across Jupiter.

Thus every enlisted man in the Vacuum Corps remembered growing up on an idyllic farm on Io with a loving grandmother named Granny. They remembered golden fields, a red barn, warm pies cooling on a sill and a stream where silver fish leaped in clean water. None of it existed. Io was, and had always been, a stripped out uranium mine where the streams could dissolve boots. Granny had originated in a two-hundred-year-old children's book and had more living grandsons than the population of several habs.

Bo received Granny at half speed.

His tape machine had a worn drive belt. Granny's voice descended into a cavernous drawl. Chickens clucked like heavy machinery. A summer afternoon seemed to last eleven subjective years. When the belt finally slipped free, a worker replaced it with one intended for a laundry press. The tape ran backward until lunch.

In Bo's memory, Granny inhaled an entire apple pie, removed it from her stomach in perfect slices and told him, “eip eht deef reven.” He would carry this counsel into adulthood without understanding it. He would also believe, with absolute sincerity, that cows were capable of walking backward into their mothers.

At night, other tape decks were rolled in and connected so the soldiers could dream. B-7331 was accidentally patched into a naval depth-charge training reel, a ladies' etiquette course and four hours of an appliance advertisement. He dreamed of hunting submarines beneath Granny's dining table while sitting with his knees together and admiring the dependable defrost cycle of the new Kelvinator Mark IX.

The errors should have left him catatonic. Instead they settled into an open, rather accommodating mind. Bo learned that the world was confusing, that authority spoke slowly or backward, and that survival often depended upon doing the obvious thing several seconds after everybody else. He was not clever enough to distrust these lessons. This made them useful.

By the time B-7331 reached finishing, his ticket was thick with amendments. TEMPERATURE IRREGULAR. IMPACT EVENT. FEED DISPUTE. PORT CONTAMINATION. TRAINING PHASE ANOMALY. POSSIBLE LAUNDRY RELATED CONTAMINANT. Someone had added, in grease pencil, HANG IN THERE.

The finishing room ran the length of the factory. A trench divided it down the middle. At the bottom, a conveyor carried the contents of failed molds toward a chute at the edge of the hab. Long ago the contents had been recycled. The recycler had broken eighty-six years earlier and the requisition for its replacement was progressing normally. Now the conveyor simply dumped failures into Jupiter.

A failed soldier announced himself when the mold cracked and released a sulfurous stench. A successful one emerged alive beneath a thick cocoon of cured biofilm. He had to tear through it before suffocating. By law, workers could not help. The struggle was the soldier's final examination and the factory's most popular spectator event.

News of B-7331's scheduled opening traveled across three shifts.

Several dozen workers crowded the railings. They came from injection, incubation, training, waste management, maintenance and a payroll office that had no plausible reason to be there. Cigarette smoke formed a private cloud beneath the lamps. Money changed hands. So did ration chits, wristwatches, two jars of pickled onions, a motorcycle carburetor and provisional ownership of a small dog.

Midge stood on an overturned drum beside a chalkboard of odds. “Clean hatch, twelve to one,” she shouted. “Sulfur, three to two. Blue or green, six to one. Patchwork, nine. Sits up under his own power, fifteen. Says Granny, twenty-five. Bites foreman, even money.”

Dottle pushed through the crowd. “What about the cigarette I jammed in his noggin?”

“Ha! Insider information nulls your bet.”

“Nah! It was outside information when I put it in.”

The argument produced a second betting pool.

B-7331 lay on a steel opening cradle under white lamps. The mold was scarred, dented, smoke-stained and repaired at the hip with a strap from a delivery truck. Its temperature card read ninety-eight point six degrees Fahrenheit, though the thermometer beside it displayed thirty-eight Celsius and neither instrument was touching the mold.

Two finishers loosened the clamps. The crowd quieted. Somewhere in the plant, a siren warned of a solvent fire. Nobody left.

The finishers hooked the overhead hoist to the upper half. A motor whined. The seam parted with a wet sigh.

No sulfur smell emerged.

The crowd roared. Half the room celebrated; the other half demanded a second sniff.

The top mold rose cleaning. Inside lay a broad young soldier with tan skin, a flattened nose and a translucent cocoon plastered across his face and chest. For one long second he did not move. Then his hands flexed. His chest convulsed. He tore the film over his mouth, dragged in his first breath of factory air and immediately began coughing from the cigarettes.

B-7331 (aka Bo Bovastein) opened his eyes. He saw fifty strangers shouting above him. Behind them hung banners promising victory, safety and death to the pinko Saturnians. He remembered sunlight on Io, Granny's pie, backward cows, submarines under the table and a refrigerator available in six decorator colors.

He sat up, then, suddenly, stuck out both hands like a doctor had ordered him to.

The crowd leaned forward, unsure whether this was a salute, a plea for assistance or the opening movement of a winning bite on the foreman.

The truck strap around the bottom half of the mold snapped. The cradle tipped.

Bo, still seated in the bottom shell, fell four feet, face first, onto the hard factory floor. There was a terrible crunch.

CHAPTER TWO THE INSPECTION - BO BOVASTEIN SURVIVES RECYCLING

The terrible crunch turned out to be Bo's right arm.

This disappointed the workers who had bet on his neck and delighted a boilermaker who had taken seven-to-one odds on an upper extremity. A number of more complicated wagers remained in dispute. The exact definitions of survived, stood up and factory floor had not been written down before money changed hands, and several workers now discovered deep philosophical convictions about all three.

Bo lay face-first beside the opening cradle with his right arm folded beneath him at an angle arms seldom choose voluntarily. Blood ran from his flattened nose and made a small red fan on the concrete. His cocoon, still wet in places, clung to his shoulders and hips like the remains of an unsuccessful pudding. He blinked twice, sneezed, and lifted his head.

“Pie,” he said.

It was his first spoken word.

This paid twenty-two to one under the category FOODSTUFF, though Midge insisted pie was a prepared dish and therefore belonged under DOMESTIC OBJECT. Dottle maintained that anything swallowed became a foodstuff eventually. The dispute was gaining volume when a foreman rang the clearing bell.

“Military inspection!” he shouted. “Clear the floor! Hide the money!”

The workers concealed their gambling proceeds in the traditional manner, by putting them in their pockets. They drifted back toward their stations, counting bills with their hands behind their backs. A few losers remained long enough to kick the broken truck strap. Two winners shook Bo's uninjured hand and wished him a glorious death in service to Jupiter.

Bo smiled at them. He had no idea who they were, but they seemed pleased.

A finishing worker cut away the last of the cocoon. As the biofilm dried, Bo's color became easier to assess. Most of him was the regulation tan printed on his ticket. Across his back, however, spread a broad patch of deep black skin from the right shoulder to the left hip, as though another soldier had been painted over him and the paint department had stopped for lunch. His hair dried into a large, pale halo. Every other

soldier in the batch had straight black hair. Bo's was the color of old straw and rose from his head in a soft, extravagant sphere that made his scalp plug impossible to locate without compressing several cubic feet of it.

His eyes were crossed. His nose bled. Saliva hung from his lower lip. When two workers pulled him upright, he listed forty degrees to port and remained there with the serene confidence of a tree growing on a hillside.

There was nothing structurally wrong with his legs. They were six-foot-four-man legs, thick with radiation-resistant bone and layered muscle designed to work under Jupiter's punishing gravity. The trouble was educational. Bo's muscles believed they were on Io.

Io's surface gravity was less than one fifth of Jupiter's familiar pull at hab level. In his implanted childhood, Bo had spent years bounding over fields, lifting hay bales, and chasing backward cows with the buoyant ease appropriate to that moon. His body was fully capable of standing straight where he now stood. His nervous system simply had not circulated the memorandum. Each time he tried to correct his posture, it issued an Io-sized command. Jupiter answered by moving the floor closer.

The workers solved this by propping him against the last row of soldiers awaiting inspection. They bent his broken arm across his chest because it looked untidy hanging down, wiped his nose with a rejected requisition form, and moved away as the military contingent entered.

The difference between soldiers and ordinary Jupiterians was difficult to miss and, in the finishing room, impossible to avoid comparing.

The newly hatched soldiers stood six feet four inches tall and weighed twenty stone apiece. Male and female specimens were the same height, breadth, and weight, differing only in the equipment that had proved too politically inconvenient to standardize. Their shoulders were wide, their waists narrow, and their bones reinforced for high acceleration. Their cells repaired radiation damage with ruthless efficiency. A clear inner eyelid could seal across each eye, and muscular flaps inside the nose closed automatically under vacuum. No one expected these refinements to let a soldier live long in open space. The military expected them to let him remain useful for several additional seconds.

They were products of a design philosophy that regarded human perfection as an expendable item.

The standard Jupiterians entering the room represented a different philosophy.

They were between three and four feet tall and nearly as wide. Their legs were six inches long, sturdy but largely ceremonial. Their arms were normal in length and thick with comfortable flesh. Most traveled on motorized wheelie carts upholstered in military green, steering with small chrome tillers and sounding rubber-bulb horns when enlisted personnel blocked the aisle. Those without carts pushed themselves along on their knuckles or accepted propulsion from a subordinate.

The contingent's leader did neither. Specialist Second Class Rgaret Iller walked.

It was a slow, swaying walk requiring concentration and an official reason, but Rgaret had both. She wore a khaki uniform fitted with sixteen pockets, fourteen of which held cigarettes. A peaked cap rested high on her lacquered hair. Under one arm she carried a thick clipboard made important by three red stripes, two brass clips, and the fact that nobody else was permitted to touch it.

Behind her rolled four military orderlies. They were broad even for standard Jupiterians, with forearms like upholstered hams. Their carts had no medical equipment. They did have tow hooks.

Rgaret stopped before the batch. Fifty-eight fresh soldiers stood in four lines under the white lamps, naked except for scalp plugs and serial tags tied around their wrists. Their backs were straight, their eyes front, and their faces solemn with memories of the same imaginary grandmother. Bo occupied the far end of the last row. The soldier beside him leaned subtly away so that Bo's pale afro would not touch him.

Rgaret opened her clipboard. The room quieted. Even the betting arguments dropped to whispers.

“New personnel,” she began, without looking at them, “you have recently experienced a serious agricultural mishap on the moon of Io.”

Fifty-seven soldiers stiffened. Bo scratched his left buttock.

“The accidents were completely separate,” Rgaret continued. “There is no evidence of a common equipment defect, coordinated negligence, enemy action, or claim against the Io Agricultural Indemnity Fund. Each of you, acting independently, suffered injuries so extensive that civilian medicine declared you dead, missing, unavailable for comment, or likely to become expensive.”

The soldiers listened in horror. Each remembered the farm. Each remembered Granny. None remembered an accident, which proved how bad it must have been.

“Fortunately, the Vacuum Corps recovered what remained of you. Through heroic medicine, military science, and financial procedures classified above your station, you have been restored to full health. Your previous property, wages, livestock, personal effects, and farm acreage have been applied to the cost of treatment. In most cases this has reduced your balance considerably.”

One soldier raised a hand. “Specialist, what do we owe?”

Rgaret turned a page. “Loan consultants are available for a fee.”

The hand went down.

“In gratitude for your rescue, you have volunteered for service in the Vacuum Corps. Your voluntary service will continue until the Saturnian menace is destroyed, your medical debt is discharged or competent authority determines that the solar system has become safe for decent people. Since competent authority has never made such a determination, you should protect your uniforms from unnecessary wear.”

The soldiers exchanged relieved glances. Most heard voluntary and imagined two or three years. The human mind is generous when estimating sentences whose numbers have been omitted.

Rgaret's voice rose into the practiced rhythm of a speech she had delivered to twelve thousand batches and heard in her sleep.

“The pinko Saturnians hate our freedom, our industry, our atmospheric architecture, our approved forms of pie, and the fact that Jupiter was placed first in alphabetical order. They lurk beyond the black, plotting to redistribute everything you own, including those items already applied to your medical debt. You will meet them in space, beneath space, and in any administrative region adjacent to space. You will shoot when ordered, advance when ordered, retreat only under revised orders, and give your lives cheerfully when the appropriate carbon copy has been filed.”

A murmur of fierce approval ran through the formation.

Bo was not listening. He was in Granny's living room on Io. A wrestling match flickered across a black-and-white television. Two enormous, yet short, Jupiterians in striped shorts struggled beneath hot lights while an announcer accused one of foreign sympathies. Granny sat beside Bo with

an apple pie balanced on her knees. The pie was warm. The crust was brown. Every time a wrestler struck the canvas, the picture rolled upward and Granny slapped the television cabinet with a wooden spoon.

In the factory, Bo inserted a finger into his left nostril. The inner vacuum flap closed around it. He withdrew, surprised, then tried the right nostril. The soldier beside him snorted. Another covered a laugh with a cough. Within seconds, half the last row had noticed the pale afro, crossed eyes, black back patch, drool, bent arm, crooked stance, and determined nasal research.

Pointing began. Then chuckling.

Bo shifted his weight and scratched his butt again. His broken arm had begun to swell, but pain messages entering his brain were competing with pie and professional wrestling. Pie held the superior frequency allocation.

Rgaret concluded with the traditional promise. “You entered this room as victims of farming. You will leave it as instruments of policy. Welcome to the Vacuum Corps. May Jupiter never regret this decision.”

The soldiers shouted, “FOR JUPITER!”

Bo shouted, “Get him, Granny!” In his mind the television wrestler had just been hit with a folding chair.

A few workers applauded. Rgaret made a mark on her clipboard and began the inspection.

She moved down the first row one soldier at a time, pushing a small rolling ladder with her. Orderlies rolled behind her, two on either side. At each specimen, with the help of the ladder, she checked the wrist tag, scalp plug, eyes, teeth, nose flaps, inner eyelids, posture, skin color, number of limbs, and general willingness to exist within published tolerances.

“The Vacuum Corps requires perfection,” she announced. “Perfection means symmetrical construction, complete equipment, responsive reflexes, regulation pigmentation, straight black hair, twenty stone within a tolerance of half a sandwich, and no defect likely to become visible during a parade.”

She lifted a female soldier's eyelid with a pencil. The clear inner lid swept across the eye. “Pass.”

She struck a male soldier below the kneecap with the edge of her clipboard. His foot kicked forward and knocked the cap off an orderly.

“Excellent reflex. Pass.”

She held a cigarette beneath another soldier's nostrils. The nose flaps snapped shut. The soldier began to turn blue while standing at attention. “Vacuum response. Pass.”

Rgaret moved methodically, wheezing with the effort. Soldiers who passed received a red check beside their serial numbers. Soldiers who did not were told they required additional care at the hospital.

There was no hospital. The hospital had existed in the original factory plan, between Rehabilitation and Employee Cafeteria Number Three. Rehabilitation now stored filter adapters. Cafeteria Number Three had burned down during a safety lecture. The room labeled HOSPITAL contained two broken cots and a trench access ramp.

The orderlies knew a shorter route, via the conveyor belt at the bottom of the trench.

In the second row, Rgaret found a soldier with one ear a quarter inch lower than the other. “Hospital,” she ordered.

The soldier looked alarmed. “Is it serious?”

“Not after treatment.”

Two orderlies seized him beneath the arms. He protested as they dragged him toward the trench. His heels left pale streaks in the factory dust. When he understood where they were going, he fought hard enough to pull one orderly off his cart. The other three rolled over him. They lifted, swung once, and dropped him onto the moving conveyor below.

The formation stared straight ahead.

“Discipline,” Rgaret told them, “is the refusal to learn from another man's mistakes.”

The inspection continued.

The process moved closer to Bo in increments measured by red checks and screams. A soldier with an extra tooth went to the hospital. A woman with mismatched earlobes went to the hospital. A man whose inner eyelids blinked at different speeds was retained for night operations. One soldier had come out green, but was so perfectly symmetrical that Rgaret classified him as olive and passed him.

At the end of the third row, she rejected a soldier for being nineteen stone and thirteen pounds. The orderlies threw in his wrist tag first to

make sure the conveyor was running.

Workers gathered again along the railings. The official hatch pools were finished, but the inspection offered a new market. Odds appeared on the side of a solvent tank.

Midge took bets on the distance Rgaret would notice Bo from. Dottle offered four to one that the orderlies would refuse to touch him. Someone from payroll opened a pool on which defect would be cited first. Broken arm began as the favorite, followed by hair, eyes, skin, drool, and category not yet understood by medical science.

Bo remained at the end of the last row, tilted sideways against his neighbor and watching a wrestling match no one else could see.

Rgaret entered the final row.

Five soldiers passed. One failed for a birthmark resembling Saturn. Three passed. One failed for excessive curiosity after asking what had happened to the failures. The orderlies returned from the trench rubbing their knuckles and complaining that fresh soldiers were getting heavier.

Only two remained before Bo. The first was a flawless woman whose nose flaps sealed, eyelids swept, posture held, and serial tag matched every entry on the clipboard. Rgaret walked around her twice, suspicious of the absence of trouble, then passed her provisionally.

The next soldier had straight black hair, approved brown skin, exact weight, full dentition, strong reflexes, and a chest measurement matching the template to the millimeter.

Rgaret reached his feet, then stopped cold. The nail of his left big toe curved inward at one corner. The surrounding skin was faintly pink. Rgaret inhaled through her teeth. “Ingrown toenail,” she sighed.

The soldier looked down. “It doesn't hurt.”

“Advanced cases often destroy the patient's sense of proportionality.”

“But I can march.”

“Hospital.”

He broke formation before the orderlies touched him. For three seconds he fought all four, lifting one cart completely off the floor and using it as a shield. The others rammed his shins. They caught his ankles, toppled him, and dragged him backward while he clawed grooves through the grime.

“It's a toenail!” he screamed. “Cut off the toe! I can still fight for Jupiter!”

“Unauthorized treatment recommendation,” Rgaret noted. “Aggravating factor.”

The orderlies swung him by the ankles and threw him into the trench. He landed upright on the conveyor, ran against it for several yards, and nearly reached the ramp before a disposal worker knocked him down with a canister of bromide gas.

Then Rgaret came to Bo.

She looked first at the ticket: B-7331. She looked at his broken arm. She looked at the blood crusted beneath his nose, the saliva on his chin, the black patch covering half his back, the pale afro surrounding his head, and the crossed eyes attempting to focus on two different points behind her. She observed his bent posture. She watched him pick his nose. When he removed his finger, the nose flap remained closed for several seconds and whistled.

“Uhhh,” Bo said.

Rgaret lowered the clipboard and her mouth opened. It stayed open. The factory waited.

The orderlies arranged their carts around Bo. One fastened his chin strap. Another flexed his hands. A third examined the nearest route to the trench and estimated the turning radius. The fourth produced a short length of tow cable.

Rgaret walked around Bo once. Then again. She pressed the black patch with one finger as if expecting it to rub off. She tugged a lock of his hair and lost her hand up to the wrist. She aimed each of his eyes toward the same target; when she released them, they returned to their assigned sectors.

Bo narrowed his eyes. “Granny?”

Rgaret's lower jaw descended another half inch.

Overhead, the public-address speaker popped. A burst of static rolled through the room, followed by a woman's voice exhausted by tobacco.

“Specialist Second Class Rgaret Iller. Report to the supervisor's office immediately. Specialist Iller to the supervisor's office. Bring your clipboard, identification badge, desk key, parking permit, and any government property you may have accidentally taken home.”

Rgaret looked up. “Now?”

The speaker clicked off.

She looked from Bo to the orderlies and back to Bo. Professional outrage restored movement to her face. “Nobody touch him,” she said. “Nobody move him. Nobody classify him, treat him, feed him, touch him or let him metastasize. I am going to bring back a staff photographer and document this incident for the permanent record.”

The orderly with the tow cable raised a hand. “Can we breathe?”

“Only as required by the military code of uniform justice.”

Rgaret tucked the clipboard under her arm and waddled toward the exit with furious dignity.

The finishing room exhaled.

Workers rushed the railings. New odds were shouted before the doors finished swinging behind her. Hospital became a one-to-twenty favorite. Immediate trench disposal paid almost nothing. Photography, medical study, public exhibition, and promotion to officer appeared as long shots. Dottle offered a special pool on whether Rgaret would return with a camera, a flamethrower, or a priest.

Money moved faster than the conveyor.

Bo watched the invisible wrestling referee argue with Granny. His right arm throbbed now. He looked at it with mild interest and decided it belonged to somebody standing very close.

The orderlies waited. They were military personnel and therefore capable of remaining motionless for long periods when an order saved effort.

Ten minutes passed. Then the doors flew open and Rgaret returned alone.

Her cap was missing. So were her badge, red-striped clipboard, desk key, and the expression of a woman with future responsibilities. She carried a cheap rubber stamp in one hand and an uncapped pad of red ink in the other. Her face had gone beyond anger into the calm geological pressure that creates mountains.

The workers fell silent. Even Dottle stopped taking bets.

Rgaret crossed the floor on her six-inch legs. She did not inspect the remaining distance. She did not consult a form. She stopped directly in

front of Bo and stared up at him.

“Congratulations, dumbass,” she said. “You passed.”

Bo grinned. He had heard congratulations before, usually after a wrestler hit another wrestler with furniture.

Rgaret inked the stamp. The stamp was intended for cargo manifests and produced letters nearly an inch high. She seized Bo by the pale hair, pulled his head down, and pressed it against his forehead. PASSED.

The red word ran from one temple to the other in approximately seventy-two-point type.

Rgaret threw the stamp onto the floor. Then she tossed the ink pad onto the conveyor, where it began a slow journey toward Jupiter. She turned to the orderlies. “As of six minutes ago, I am no longer authorized to inform you of your duties.”

One orderly asked, “What happened to the clipboard?”

“Government property.”

“What happened to the photographer?”

“Still employed.” Rgaret marched out of the finishing room without another word.

For half a second, nothing moved. Then the betting floor erupted.

Those holding PASS tickets demanded payment. Those who had bet on hospital challenged the authority of a fired inspector. Midge paid three winners. Dottle refused to pay six. Someone seized the chalkboard. Someone else seized the person who had seized the chalkboard. Bills, ration chits, cigarettes, and one jar of pickled onions changed hands in both directions.

The orderlies looked at Bo.

Bo looked at the two Rgarets produced by his crossed eyes as they disappeared through two different doors.

The first orderly pointed at the red word on Bo's forehead. “Passed.”

The second pointed toward the trench. “We were already set up.”

The third had attached the tow cable and did not want to coil it again.

The fourth shrugged.

Military procedure offered no guidance for a soldier passed by an

unemployed specialist after being ordered not to move by that same specialist while she was employed. The natural solution was to complete the action requiring the least paperwork.

They grabbed Bo.

He did not fight. The orderlies took one leg and one arm each, though two of them had to share the unbroken arm. Bo swung gently between the carts, watching the factory ceiling pass overhead. He thought this might be another farming accident.

They carried him to the trench.

“Am I going to the hospital?” Bo asked.

“That's right,” said an orderly.

“Will there be pie?”

“Absolutely.”

They threw him in.

Bo landed on the moving conveyor with his broken arm beneath him. He rolled onto his back, flailed once, and struck the sidewall. Above, the orderlies turned away. The remaining new soldiers were ordered into columns and marched out of the factory toward uniforms, weapons, and service without a stated end date.

The conveyor carried Bo toward the disposal chute.

He tried to stand. Io told his muscles one thing, Jupiter told them another, and the belt contributed a third opinion. He fell, sat up, fell again, and finally traveled backward on his backside with his legs in the air.

Behind him, the workers began fighting in earnest.

CHAPTER THREE 14 DAYS TO CALLISTO - ARLEY MITHS ATOMIC PROPULSION

The Vacuum Corps described the voyage from low Jupiter orbit to Callisto as a two-week deployment cruise.

This was true in the same way that a military haircut was a hair-preservation program. The Arley Mith could have covered the distance much faster. It simply had no institutional reason to do so.

Carrier Vessel, Bomb, Nuclear number 66743 hung above Jupiter with its bow pointed toward Ganymede and its stern pointed toward the upper atmosphere. Its official designation was CVBN-66743. Its name, ARLEY MITH, appeared in thirty-foot letters along both sides of the hull, copied from a corroded brass plate found in an ancient naval archive. No one remembered, Arley Mith, who had been a procurement clerk during the third Saturnian invasion a hundred years prior. They could have simply looked it up in a library but no one ever bothered.

The carrier massed approximately two million metric tons before stores, pulse propulsion units, reserve soldiers, sovereign debts, and officers were added. It carried one hundred battalions. Ten were awake, uniformed, and assigned bunks. Ninety were kept as dehydrated biological forms in cryogenic magazines, one thousand soldiers to a battalion and one battalion to a drawer. The storage officers referred to them as reserves. The commissary referred to them as dry goods.

Bo Bovastein was among the ten thousand awake.

His broken arm had been set aboard the orbital depot by a medical corporal who aligned bones with a carpenter's square. The red PASSED stamp remained faintly visible across his forehead. His pale afro had survived issue clippers by jamming them. He now stood with his battalion behind several feet of shielding, waiting for a ship driven by nuclear explosions to begin exploding.

He had been told not to worry and he didn’t because he wasn’t paying attention.

The Arley Mith belonged to the oldest surviving family of practical spacecraft: machines propelled by throwing bombs out the back. The idea was primitive, violent, and extremely effective, three qualities that assured its adoption by the Vacuum Corps.

A pulse unit was a one-ton deuterium fusion device with an advertised

yield of one megaton. An automatic launcher (automatic in the sense that it required only eleven men) dropped each unit through the stern tube. At the proper distance it detonated. The explosion converted its propellant facing into a fast, thin spear of plasma. That plasma struck a hemispherical pusher plate wider than a city block. The plate moved forward. Shock absorbers translated the blow into something the rest of the ship could survive.

The basic arrangement had been imagined in the antique age of tailored suits and atmospheric nuclear tests. Early designers had learned that a steel plate could survive repeated explosions if it was large, polished, sprayed with castor oil, and not given time to become sentimental about the experience. Small chemical models had even hopped through the air on successive blasts. The full-scale program died before the machinery did. Its drawings survived in vaults whose labels became holy text.

By 2727 the Vacuum Corps still did not understand every line on those drawings. It understood the important ones: THIS SIDE TOWARD SHIP and DO NOT ARM IN MAGAZINE.

The carrier's pusher plate did not merely endure the flash. Geometry helped. In open space, an explosion wasted energy in every direction. The pulse unit therefore shaped a fraction of its fireball into a narrow column aimed at the plate. The plasma expanded at thousands of kilometers per second, crossed the stand-off distance in a fraction of a millisecond, and struck before the plate could meaningfully heat through. A film of oil flashed into vapor, carrying surface heat away. The main shock absorbers compressed, the secondary suspension stroked, and two million tons of ship received a shove.

Ancient engineers had once proposed long shock absorbers so a sequence of brutal impulses would emerge at the payload as steady acceleration. The Jupiterians shortened them. Their soldiers could tolerate fifty gravities briefly, ordinary Jupiterians could tolerate a surprising amount when securely upholstered, and steel was expensive.

The Arley Mith used two-stage pneumatic cylinders salvaged from mining presses. A correctly timed pulse drove the pusher plate forward, compressed the primary cylinders, and allowed the secondary carriage to feed the impulse into the hull over several seconds. An incorrectly timed pulse produced a noise like the Regent Emperor slamming a door.

Both were considered thrust.

At 06:00 ship time, Captain Dward Harl ordered departure.

The first pulse unit failed to leave the tube because a safety pin remained installed. The second left the tube with the first attached. They detonated together. The pusher plate received a clean two-megaton slap, the shock absorbers bottomed out, and every unsecured wheelie chair on the command deck crossed to starboard.

The carrier gained 0.73 meters per second and lost one coffee urn.

This required explanation.

For an ideal one-ton pulse unit whose effective exhaust velocity was two thousand kilometers per second, the rocket equation gave a velocity increment close to one meter per second against a two-billion-kilogram ship: delta-v was approximately exhaust velocity times pulse mass divided by ship mass, or 2,000,000 meters per second multiplied by 1,000 kilograms and divided by 2,000,000,000 kilograms. Real coupling losses, plate geometry, shielding, and the desire not to turn the stern into vapor reduced the useful increment. The Arley Mith normally credited each pulse with half a meter per second.

The double pulse should therefore have provided roughly one meter per second. It did not. The pulse-accounting office classified the missing quarter meter per second as shrinkage.

The launch officer removed the safety pin from the next unit personally.

Then the bombs began in earnest.

One flash every three seconds blossomed behind the ship. The pusher plate hammered. The suspension breathed. Acceleration settled to roughly one sixth of a meter per second squared (about 0.017 g) because a half-meter-per-second pulse arrived every three seconds. It was gentle by soldier standards. It was less gentle to soup.

The command deck tracked the burn on green radar screens and a mechanical integrating table. Brass wheels multiplied pulse count by nominal impulse. A lieutenant read velocity from a rotating drum. Two ensigns independently plotted the orbit in grease pencil. They disagreed by seventeen thousand miles and solved the difference by averaging their charts.

There was a reason departure from low Jupiter orbit demanded real speed. Callisto might be only 1,883,000 kilometers from Jupiter's center, but the Arley Mith began deep in Jupiter's gravity well, circling at a radius of about 100,000 kilometers. At that altitude a circular orbit required roughly 35.6 kilometers per second. Ganymede, at 1,070,400 kilometers, moved at only 10.88 kilometers per second. Climbing

outward was not a matter of pointing at the moon and traveling 970,000 kilometers. The carrier first had to raise the far end of its orbit while preserving enough sideways speed not to fall into Jupiter.

A simple two-body transfer from 100,000 kilometers to Ganymede's orbit required a departure increase of about 12.54 kilometers per second. At arrival, the elongated transfer orbit moved at roughly 4.50 kilometers per second while Ganymede moved at 10.88. Matching the moon therefore required another 6.38 kilometers per second. Total ideal transfer delta-v: 18.92 kilometers per second, not counting Ganymede capture, navigational corrections, arguments, or the mass of duty-free liquor purchased on arrival.

At half a meter per second per pulse, 18.92 kilometers per second represented nearly 37,850 pulse units. The carrier did not actually use all of them in one burn. Some pulses carried additional inert reaction mass, in the form of water, powdered iron, chipped shielding, and once a crate of typewriter parts. All this in order to improve momentum coupling at lower plasma velocity. The practice increased thrust per costly fusion package while lowering effective exhaust velocity. It also made the rocket equation less flattering and the accounting department happier.

During the first outbound burn, the Arley Mith fired 8,160 high-coupling departure units over six hours and forty-eight minutes. Each package produced an average useful increment of 1.54 meters per second by accelerating several tons of inert mass with the fusion flash. The figure varied by batch. Pulse Unit Lot 44-B produced excellent momentum and alarming purple light. Lot 51-F produced scowls and frowns in the procurement accounting department.

When the burn ended, the carrier entered its transfer ellipse.

The journey to Ganymede now required 1.446 days. This was not an estimate produced by a tourism office. It came from half the period of an ellipse whose semimajor axis was the average of the starting and ending radii: 585,200 kilometers. Put that into the old formula: pi times the square root of a cubed divided by Jupiter's gravitational parameter of 126,686,532 cubic kilometers per second squared. The result was about 124,951 seconds.

The navigation office rounded this to Thursday.

For the next thirty-four hours the Arley Mith coasted with great efficiency. Coasting consumed no bombs, no reaction mass, and almost no decisions. Jupiter shrank behind the carrier, filling half the aft

observation blister instead of all of it. Radiation monitors chattered. The ship's analog guidance gyros hummed in cabinets large enough to rent. Every six hours a vacuum-tube calculator compared the predicted stars with the observed stars and printed a paper strip reading ACCEPTABLE.

On the third comparison, the observed stars were actually rivets inside the shutter.

The result remained acceptable.

Bo spent the coast in Troop Compartment 19, where four thousand bunks had been installed in space intended for three thousand. He slept on the uppermost rack because the assignment corporal thought his hair would provide impact protection against the ceiling. When the ship rotated for Ganymede braking, Bo woke upside down, which improved his posture.

The carrier approached Ganymede from the inside and behind. To rendezvous, it had to add orbital speed, not remove it. This confused generations of officers. The carrier was traveling outward and appeared to be moving forward, yet Ganymede's nearly circular path swept sideways at 10.88 kilometers per second. The transfer ellipse supplied only about 4.50. The Arley Mith turned sternward, fired 4,140 heavy-coupling pulse units, and raised its velocity toward Ganymede's.

The burn was accurate to within ninety meters per second.

A correction burn removed eighty-seven of them. The remaining three were retained as a navigational reserve.

At forty-three hours after departure, the Arley Mith entered the Ganymede traffic pattern.

Ganymede was the largest moon and behaved as though it knew. Its orbital stations, fuel farms, casinos, bonded warehouses, customs docks, and military depots circled beneath colored advertising beacons. The moon's surface gravity was only about 1.43 meters per second squared, less than six percent of comfortable Jupiter gravity. Standard Jupiterian officers therefore became temporarily athletic. A determined officer could push off a wheelie cart, remain airborne for several seconds, and land in a different casino.

The resupply order called for eighteen hours.

The first delay came when the deuterium pulse units arrived at Dock Seven while the Arley Mith occupied Dock Seventy. The tug dispatcher insisted the handwritten zero was a coffee stain. The load was moved

after a three-hour inquiry established that the coffee stain had a serial number.

The second delay involved the reserve battalions. Cryogenic magazines needed liquid helium, but the requisition requested helium balloons. Six thousand patriotic balloons arrived bearing the slogan CALLISTO OR BUST. The supply chief accepted them rather than admit an error and ordered the troops to inhale none of them until after departure.

The third delay was recreational.

Officers were granted four hours of moonside liberty. Ganymede offered more casinos per square mile than barracks, schools, oxygen shelters, and legitimate reasons to visit Ganymede combined. Neon signs promised honest dice, fair cards, and gravity-adjusted roulette. The casinos made no promises concerning officers.

Captain Harl returned on time because captains were permitted to gamble in the wardroom. Forty-three junior officers did not. Twelve had become engaged. Seven were attempting to mortgage government assets. Nine were in a police station. The remaining fifteen had been arrested at the Pale Spot Casino for cheating at games whose rules they had written themselves.

Their method involved magnetic dice, marked cards, a radio hidden in a hat, three cooperating croupiers, and an analog calculator carried under a tunic. The casino detected the scheme when the calculator overheated and set the officer's shirt on fire.

The Vacuum Corps demanded their release on grounds of military necessity. Ganymede authorities replied that the officers had claimed to be civilians while cheating and military heroes after arrest. The distinction required a hearing.

The Arley Mith waited three days and eighteen hours.

During the first day, the captain threatened to leave without them. During the second, the casino threatened to return them. During the third, both parties reconsidered. At the final hearing the judge released the croupiers, kept the money, and sentenced the officers to remain on Ganymede until they could explain probability without using the phrase a sure thing.

The Arley Mith left them behind.

This improved the carrier's mass by nineteen tons and its decision-making capacity by an unmeasurable amount.

Unfortunately, the delay had spoiled the planned departure geometry for Callisto. Ganymede and Callisto had continued moving while the officers were being processed, a possibility absent from the original schedule. Ganymede completed an orbit in 7.1556 days. Callisto required 16.6904. Their relative angle changed by about twenty-eight and three-quarter degrees per day. After nearly four days, the target moon had shifted more than one hundred degrees relative to the launch plan.

The navigator proposed waiting for the next printed window.

The captain asked when it opened.

“Nine days,” came the flat reply.

The captain asked whether there was another kind of window.

There was. It was labeled EXPEDITED MILITARY TRANSFER and required more bombs.

The navigation team spent one day preparing it. For the first eight hours they calculated in statute miles. For the next six they corrected to nautical miles. Finally a sergeant pointed out that every orbital constant on the plotting board was in kilometers. The team divided by the appropriate conversion factors, multiplied by two inappropriate ones, and produced a course that missed Callisto by only 410,000 kilometers.

This was accepted as a starting point.

A normal Ganymede-to-Callisto Hohmann transfer was almost polite compared with the climb from Jupiter. The inner radius was 1,070,400 kilometers; the outer was 1,882,700. The transfer ellipse had a semimajor axis of 1,476,550 kilometers. Half its period was approximately 500,792 seconds, or 5.796 days.

Ganymede's orbital speed was 10.879 kilometers per second. The carrier needed to leave at 12.285, a departure increase of 1.405 kilometers per second. At Callisto distance the transfer orbit would be moving at 6.984 kilometers per second, while Callisto moved at 8.203. Arrival matching required another 1.219 kilometers per second. The clean two-impulse total was therefore 2.624 kilometers per second.

For a two-million-ton carrier, clean was a theoretical condition.

The Arley Mith fired 1,760 loaded pulse units to depart Ganymede. Their effective average impulse should have added 1.41 kilometers per second. It added 1.47 because the deuterium shipped from Dock Seven was military grade and the typewriter parts had sharp edges. The carrier entered a faster, slightly higher ellipse than ordered.

No one noticed for eleven hours because the velocity drum had reached the end of its paper roll. The replacement roll was installed upside down and showed the carrier slowing. The command deck congratulated the engine room.

When the error was discovered, the Arley Mith was already above its intended path. A correction could have been made immediately for 118 meters per second. The captain delayed the burn until after breakfast to avoid spilling coffee. By then it required 207 meters per second.

The engine room fired 260 correction units.

A loader inserted one backward.

Pulse units were symmetrical in appearance but not in purpose. The backward device shaped its plasma away from the pusher plate. It produced no useful impulse. It did, however, accelerate its own casing into the stern sensor mast. The mast survived but thereafter reported all ranges in feet.

The correction ended within eighteen meters per second of plan. The missing eighteen were listed as shrinkage.

For five days the carrier coasted outward.

At its fastest point after departure it crossed more than a million kilometers of Jovian space with no fuel expenditure at all. Its path was a conic section predicted centuries before anyone built a wheelie cart. Jupiter's gravity performed nearly all the navigation. The universe supplied this service free of charge, which is why the Vacuum Corps distrusted it.

The ten thousand active soldiers drilled in corridors. The ninety thousand reserves remained dry and cold. Bo learned to march under shipboard gravity, though he still leaned during turns. He acquired the rank of private, two left boots, and a mess tray stamped PROPERTY OF GANYMEDE CORRECTIONAL SERVICES.

He spent much of the voyage watching wrestling on a black-and-white CRT mounted above the troop galley. The signal was a thirty-year-old recording. Bo recognized one wrestler from Granny's living room and concluded the man had enjoyed a long career.

Callisto grew from a moving star into a gray-white disk scarred by ancient impacts. The moon orbited 1.883 million kilometers from Jupiter and completed one circuit every 16.69 days. Its orbital speed was only 8.203 kilometers per second, but only was a word used by people

who did not have to stop two million tons.

The Arley Mith rotated stern-first for braking.

The scheduled insertion called for roughly 1.22 kilometers per second, plus corrections. At one useful meter per second from each heavy-coupling pulse, about 1,220 units should have sufficed. The ordnance clerk issued 1,220 devices and a sealed envelope containing eight spares.

The sealed envelope contained meal vouchers.

The first braking sequence went perfectly for nine minutes. Then the firing controller reached pulse number 180, consulted the inverted velocity chart, and concluded the ship was accelerating in the wrong direction. He ordered the pulse cadence doubled. The pusher plate received one detonation every one and a half seconds. The suspension compressed before fully extending from the previous blow. Soldiers bounced in their restraints. Officers crossed the command deck in formation without intending to.

The Arley Mith removed too much velocity.

Instead of matching Callisto from behind, it began falling inward beneath the moon's orbit. The closest-approach plot showed the carrier passing 61,000 kilometers below Callisto and returning toward Ganymede in a long ellipse, where the casinos had already circulated photographs of the officers.

Captain Harl ordered an immediate correction.

The engine room requested bombs.

The ordnance clerk presented meal vouchers.

For eleven hours the carrier drifted while stores personnel searched the wrong magazine. The required pulse units were eventually found behind the helium balloons. A banner reading CALLISTO OR BUST had wrapped itself around the inventory sign.

The corrective burn restored the missing velocity, shifted the encounter point, and used 690 pulse units that had been reserved for the return journey. The return journey was therefore shortened administratively.

Callisto Military Occupational Control assigned the Arley Mith a holding orbit. The carrier arrived on the correct day but on the wrong side of the moon. It spent one day, twenty-one hours, and forty-eight minutes circling Jupiter in formation with Callisto while traffic control cleared a lane between ore barges, drop ships, and a tanker whose pilot insisted he

had the right of way because he was larger.

The Arley Mith was larger.

The tanker pilot amended his statement to morally larger.

At exactly fourteen days after the first double pulse above Jupiter, CVBN-66743 entered Callisto deployment orbit.

The official voyage ledger was a triumph of precision. Low orbit to Ganymede: one day, ten hours, forty-two minutes. Resupply and legal delay: three days, eighteen hours. Revised navigation and phasing: one day. Ganymede to Callisto transfer: five days, nineteen hours, six minutes. Correction, missed approach, and traffic hold: two days, twenty-four minutes. Total: fourteen days exactly, after the clerk moved twelve minutes from propulsion to ceremonies.

The carrier had traveled millions of kilometers, expended more than fifteen thousand fusion devices, misplaced forty-three officers, used Jupiter's gravity with exquisite mathematical elegance, and wasted nearly half its schedule because an analog calculator caught fire in a casino.

The deployment officer called the voyage routine.

CHAPTER FOUR COMPARTMENT NINETEEN - FROM PROPAGANDA FILM TO CHILDRENS CARTOON SHOW

The most studied thirty-four hours in the social history of the Vacuum Corps were preserved by accident, condemned by the government, celebrated by its enemies, restored by historians, censored by educators, and finally broadcast to children between advertisements for sugared breakfast paste.

The surviving film is generally known as Compartment Nineteen.

It begins with static.

A gray field rolls upward across the screen. The picture tears, steadies, and reveals four thousand bunks installed in a room designed for three thousand. The finest male specimens produced in a five hour period on Jupiter, fill every aisle. Fresh soldiers lie in racks, climb ladders, dress, eat, scratch, argue, and discover for the first time that other people possess the same childhood memories. In the upper-right corner, a white time code reads 2727-081-14:03:11. The date is wrong. The hour is probably correct.

The original images came from surveillance cameras in Troop Compartment 19 aboard CVBN-66743, the Arley Mith, during its thirty-four-hour coast from low Jupiter orbit to Ganymede. Cameras watched the bunk area, mess hall, latrine, and recreation room. The security unit recorded them on two-inch quadruplex videotape, a medium that stored pictures by spinning four magnetic heads across the tape at high speed. A complete recorder occupied two cabinets, required forced-air cooling, and could erase an hour of evidence if a corporal leaned a magnetic name badge against the wrong panel.

The surveillance system officially had no microphones.

The film has dialogue.

Historians have argued about this for nearly three centuries. One school maintains that hidden audio recorders existed but were omitted from procurement records. Another believes the security unit borrowed the public-address return circuit. A third holds that the voices were fabricated by the first editor, a person known only as K, who may have been a dissident filmmaker, an intelligence office, three escaped tape technicians, or a typographical error.

The voices fit the mouths badly. Sometimes a sentence begins before the

speaker. Sometimes Bo's lips move and another soldier belches. At one point the same laugh is heard from six directions. Yet certain incidental sounds: the pulse-drive suspension, mess trays, ventilation fans, and a latrine valve with a distinctive three-note squeal, match the ship's engineering records too precisely for easy dismissal.

Compartment Nineteen was never one film. It was an argument conducted by editors who could not meet one another because they lived in different centuries.

The first version appeared in the late 2720s as an illegal anti-propaganda picture called The Children Jupiter Ate. K combined the surveillance tape with sixteen-millimeter footage shot by the Department of War for its unfinished series, Your Happy Vacuum Corps. The government film provided sharp images of polished boots, smiling officers, clean mess tables, and soldiers marching beneath banners. The surveillance tape provided everything else.

K's narrator spoke slowly and gravely over images of the crowded compartment.

“These are not warriors,” the narrator said. “They are manufactured innocents, supplied with a counterfeit childhood and transported toward a war they cannot understand.”

The picture cut to Bo Bovastein asleep in the top bunk. His pale afro pressed against the ceiling and spread sideways like insulation. His right arm remained in a crude cast. One crossed eye was open. The other appeared to be watching a different dream.

“Observe Subject B-7331,” K continued. “He has existed as an independent human being for less than forty-eight hours.”

Bo picked his nose in his sleep.

The shot lasted fifty-three seconds.

In the early 3000s, the surviving material was purchased by Jovian Children's Television and re-edited into a Saturday morning historical cartoon called Onrad and the Brave Boys of Jupiter. The soldiers were not animated, owing to cost. Instead, cheerful music, painted title cards, bouncing arrows, sound effects, and an enthusiastic historian were added to the same black-and-white footage.

“Meet Onrad!” the children's narrator cried over K's solemn image. “He's a brand-new Vacuum Corps pal learning the importance of teamwork, cleanliness, and keeping his fingers out of government property!”

A cartoon finger wagged in the corner of the screen.

Bo continued picking his nose. Onrad was his legal first name.

Of the finished program's thirty-seven minutes and twelve seconds, scholars estimate that nineteen minutes show Bo engaged in nasal exploration. Another six minutes consist of belching. The balance contains the reason the film survived.

The first important sequence occurs in the mess hall eight hours into the coast.

The mess hall camera looks down from behind a ventilation grille. Soldiers sit at bolted tables with trays of protein loaf, gravy, and peas of uncertain allegiance. The Department of War inserts show the same food in color, although the surveillance portion remains black and white. In the propaganda footage, the gravy shines. In the security footage, it moves.

Bo sits with five soldiers from his platoon and three from the platoon whose bunks begin on the opposite wall. The later children's edition identifies them with brightly colored arrows, though two arrows point to the same man and one points to a fire extinguisher.

A soldier named J-4012 leans across the table. “I heard Lieutenant Tedd say the Saturnians don't take prisoners.”

“Why not?” Bo asks, between mouthfuls of loaf.

“Because they eat them.”

K's narrator interrupts. “None of these men has seen a Saturnian. Their knowledge of the enemy comes from overheard officers, training slogans, and one poster in which Saturn has a mustache.”

The children's narrator answers from three hundred years later. “That's right, boys and girls! Enemy identification was everybody's job, even when nobody knew what the enemy looked like.”

At the table, Bo stops chewing. “They eat… uh, like all of you?”

“Just the good parts,” says L-8820.

“What are the good parts?”

The soldiers look at one another. No training tape has covered this.

“Knees,” J-4012 says.

“Saturnians love knees.”

Bo looks beneath the table at his own. “Really? Why?”

“They don't have any.”

“Uh, then, how do they walk?”

“Hunched over,” says a literally green soldier from the related platoon. “They all got humps. Big ones. Full of poison.”

“And fangs,” adds L-8820.

“And little eyes,” says another. “Close together.”

All eyes turn toward Bo. His are close together because they are crossed.

“Not like yours,” the soldier adds quickly. “Eviler.”

Bo accepts this distinction.

The conversation grows as soldiers contribute information invented seconds before. Saturnians have fangs long enough to puncture steel helmets. They mumble so decent people cannot understand their treason. Their spines bend forward from a lifetime of plotting. Their babies are born with union cards. They redistribute wealth to poor people whether the poor people want it or not.

A soldier at the end of the table lowers his voice. “Some of them speak French.”

The table falls silent.

Bo whispers, “Like, all the time?”

“Yes. Even in church.”

K freezes the frame on Bo's alarmed face. “Here propaganda reproduces itself without assistance from the state. Men who know nothing teach one another what they are expected to fear.”

The children's editor adds a cartoon beret to J-4012 and plays an accordion.

“What a silly misunderstanding!” the cheerful narrator says. “Saturnians did not all speak French. Official estimates placed the figure between nine and one hundred twelve percent.”

The footage resumes.

“Has any of you actually seen one?” Bo asks.

Nobody answers immediately.

L-8820 chews a pea and looks toward the ceiling, as if the answer might be printed there. “Nobody sees a Saturnian in battle,” he says at last. “They're too fast.”

“Really? How fast?”

“Faster than seeing.”

“Then how do you shoot them?”

“Ahead of where you didn't see them.”

The table considers this tactically sound.

Bo nods. “I saw a rabid dog back on Io once. Granny said it was. But it mostly laid under the porch and foamed.”

“Saturnians foam standing up,” J-4012 added. “That's how you know.”

The original anti-propaganda film allows the soldiers' laughter to continue without comment. The children's version adds a slide whistle.

The second important sequence occurs in the recreation room. A black-and-white wrestling program plays on a wall-mounted CRT. The picture rolls whenever the Arley Mith's pulse-drive machinery resets a power relay. Bo watches with complete concentration. Behind him, other soldiers speculate on Saturnian anatomy with the confidence of committee witnesses.

One says Saturnians possess backwards elbows. Another says they can remove their heads for tax purposes. A third has heard they smell of boiled cabbage and ration cards. Bo asks whether a Saturnian can be friendly. The room becomes uncomfortable.

“They can pretend,” J-4012 says. “That's the worst kind.”

“How can you tell?”

“If one is nice to you, it's a Saturnian.”

Bo looks around the compartment. No one has been especially nice to him. “I think we're safe,” he says.

This line appears in every surviving edition. K used it to indict the system. The Department of War later used it in a recruitment advertisement. The children's program printed it on lunch boxes.

The most disputed sequence begins at hour twenty-one in the latrine.

The original security camera was mounted above the entrance to discourage theft of plumbing. It looked across a row of sinks, urinals,

toilet stalls, and medical disposal fixtures. K's version shows the entire frame. A government reissue from 2814 placed a black rectangle over the center. The rectangle arrived five seconds late, covered the wrong soldier, drifted toward a hand dryer, and remained there after everyone left.

The early-3000s children's edition attempted stronger censorship. A smiling cartoon rocket labeled PRIVACY PATROL moves across the screen. It follows Bo poorly.

Bo enters carrying a military colostomy pouch and an instruction card.

His digestive tract had not completed development in the mold. The upper system worked with enthusiasm. The lower system ended early. A surgical outlet on his abdomen diverted waste into a replaceable bag, which the supply department classified as field-expedient luggage. Doctors could have reconstructed the missing section eventually. The Vacuum Corps considered eventually an unauthorized delay.

Bo reads the card upside down, peels away the old pouch, fits a new one, and discovers the disposal clamp. His face brightens.

Several soldiers wait near the stalls. They watch him with the solemn fascination given to an unfamiliar weapon.

Bo holds up the pouch. “I don't have to sit down to poop,” he informs them with a smirk.

Nobody replies.

“I can do it standing up.”

The cartoon rocket swerves across a sink.

Bo looks at the row of soldiers waiting for toilets. He grins. “You guys can suck it!”

The other soldiers stare while the audio drops into static.

Whether Bo actually said this remains the central controversy in Bovastein documentary studies. The phrase matches his lips better than most dialogue in the film, but it does not match his vocabulary anywhere else in the surviving footage. K's defenders argue that the clarity proves authenticity. Government historians argue that K inserted the line to make military medicine appear grotesque. Children's Television maintained that suck referred to inefficient plumbing and was therefore educational.

A frame-by-frame examination performed in 3041 found a splice six feet

before the line and another nine feet after it. This established nothing. Every scene in the film had been spliced repeatedly, sometimes with adhesive tape, sometimes with office staples, and once with a strip of dried seaweed.

The children's narrator appears immediately after the disputed sentence. “Different bodies solve problems in different ways!” he says. “Bo's special tummy bag meant he never had to miss an exciting moment waiting for a stall.”

A title card reads: EVERY SOLDIER HAS SOMETHING TO CONTRIBUTE.

The camera shows Bo dropping the instruction card into a urinal.

The final significant exchange was recorded shortly before the Arley Mith rotated for the Ganymede braking maneuver. Soldiers lie in their bunks, talking across the narrow aisles. Jupiter has become a shrinking glow in the observation panel. The compartment lights are low.

Bo asks, “Do Saturnians have grannies too?”

No one answers.

“They can't,” J-4012 says eventually.

“Why not?”

“Grannies only grow on Io.”

“Mine did.”

“See?”

Bo thinks about this. “If a Saturnian had one, maybe she could tell him not to eat knees.”

A long silence follows.

“Go to sleep, Bo,” somebody says.

“Okay.”

K ends The Children Jupiter Ate on that silence. The screen fades to black while the narrator speaks of manufactured memory, inherited hatred, and men sent to kill an enemy they cannot picture.

The Department of War restoration replaces the speech with a brass march.

The Saturday morning edition does neither. It continues into the braking

rotation. Artificial down changes direction. Blankets, boots, mess trays, and three unsecured soldiers drift across the compartment. Bo rolls out of the top bunk, catches his pale afro against a pipe, hangs upside down for six seconds, and belches.

The children's historian laughs warmly.

“And that, boys and girls, is how Private Bo learned there is more than one way to look at history!”

The credits roll over nine additional minutes of Bo picking his nose.

CHAPTER FIVE THE BAD APPLE - BO IS DEMOTED TO PRIVATE SUBCLASS ALPHA

EDITOR'S NOTE

The following papers were recovered from Company Records Packet 9997-C, CVBN-66743 ARLEY MITH. Historical duty rosters show that Third Lieutenant Ochbach and Captain Phompson shared one office, one secretary, one wastebasket, and one wall clock. Their desks faced each other at a distance of eleven feet.

Both officers dictated their notes to the same secretary, Clerk-Typist Ancy Obb. Obb typed each item, corrected nothing unless ordered, folded it into a handwritten envelope, and placed the envelope in the office pneumatic-tube terminal. The carrier's central dispatch station received the capsule, stamped it, sorted it, and returned it through the same pipe to the terminal beside the other desk. Normal desk-to-desk transmission time was three minutes.

The officers could hear one another dictating. Surviving testimony indicates that they considered listening unofficial and pneumatic correspondence official.

Spelling, punctuation, routing marks, and rank-related uncertainty are preserved.

= =

DOCUMENT 1 -- INCIDENT REPORT

Vacuum Corps FORM 81-B (INCEDENT, MORAL, OR OTHER)

CVBN-66743 ARLEY MITH

IN ROUTE: GANYMEDE TO CALLISTO

DATE TYPED: SHIP DAY 006 / 0914 HOURS

FROM: 3RD LT. OCHBACH, 9997TH BN., COMPANY C

TO: CAPT. PHOMPSON, COMMANDING, COMPANY C

SUBJECT: REPORT OF UNSATISFACTRY CONDUCT, SERIAL B-7331

1. I wish to begin this report by saying that the men of the 9997th are the finest body of fighting persons ever manufactured for service to Jupiter. Their moral is high, their bodies are symetrical in all militarily important directions, and with one isolated excepton they have conducted

themselfs during the Ganymede layover and following deployment cruise with credit to the company, the battalion, the carrier, the Vacuum Corps, and me.

2. It would be unjust to hold the entire platoon accountable for one bad apple in the military barrel. A barrel may remain sound even when one apple is soft, discolored, cross-eyed, improperly haired, and spends nearly all available duty time watching wresting matches on the recreation room television.

3. The apple in question is Serial B-7331.

4. B-7331 lounges in the recreation room whenever he is not specifically ordered to lounge elsewhere. He watches old black-and-white wresting matches and talks without stopage concerning body slams, flying elbow drops, sleeper holds, foreign objects, tag-team betrayels, masked referees, and the proper military employment of a folding chair. His discussions have infected other troops. Yesterday six privates attempted to decide who would win a match between Granny and the pinko masked Mad Saturnian, despite neither combatant being present and there being no authorized ring.

5. I have councelled B-7331 that wresting is entertainment and not an approved close-combat doctrine. He replied that this depends on whether the other fellow has a chair.

6. Until Ganymede the above matters were irritating but not actionible. The following incident has changed my opinion.

7. During routine rifle-cleaning instruction at Arley Mith Supply Annex 4, B-7331 was observed attempting to clean his service rifle while a full magazine remained inserted and one round was chambered. The safety lever was in a position which three witnesses describe as probably unsafe. B-7331 had placed the cleaning rod into the muzzle and was explaining to two other soldiers how the rifle resembled a famous wrestler named The Uranium Undertaker.

8. The instructor removed the weapon. B-7331 asked if this counted as a disqualification. No shot was fired, although this appears to have resulted from intervention rather than comprehention.

9. This incident proves actionable incompetance. I therefore recommend that Serial B-7331 be demoted immediately, both as punishment and as a warning to any soldier who thinks weapon maintenence is a tag-team event.

RESPECTIVLY SUBMITTED,

3RD LT. OCHBACH

Platoon Commanding Person

[HANDWRITTEN ENVELOPE]

TO: CAPTAIN PHOMSON, OTHER DESK

FROM: LT. OCKBACK, THIS DESK

IMPORTENT -- DO NOT BEND AGAIN

TUBE DISPATCH: SENT 0914 / CENTRAL RECEIPT 0915 / DELIVERED 0917

= =

DOCUMENT 2 -- REPLY

COMMAND CORRESPONDANCE SLIP

DATE TYPED: SHIP DAY 006 / 0922 HOURS

FROM: CAPTAIN PHOMPSON

TO: THIRD LIEUTENANT OCHBACH

RE: YOUR FORM 81-B ON B-7331

Lieutenant:

Your report is received, along with the envelope which says my name wrong.

B-7331 is already a private.

How can he be demoted? What is lower than that?

CAPT. PHOMPSON

Company C Commanding

P.S. Stop dictating your answer while I am dictating this question. It confuses Miss Obb and she only has one typewriter.

[HANDWRITTEN ENVELOPE]

TO: 3rd LEUTENANT OCHBACH, ELEVEN FEET AWAY

FROM: CAPT. THOMPSON, COMANDING

NO STAMP REQUERED

TUBE DISPATCH: SENT 0922 / CENTRAL RECEIPT 0923 / DELIVERED 0925

= = = =

Do not send me all copies. Send me the important copies and one copy explaining which copies are important.

CAPT. PHOMPSON

[HANDWRITTEN ENVELOPE]

TO: LT. OCHBACH

FROM: THE CAPTAIN

APROVED PROBABLY

TUBE DISPATCH: SENT 0934 / CENTRAL RECEIPT 0935 / DELIVERED 0937

= =

DOCUMENT 5 -- AFFIRMATION OF AFFIRMATIVE

ACKNOWLEGEMENT AND NOTICE OF COMMENCMENT

DATE TYPED: SHIP DAY 006 / 0940 HOURS

FROM: 3RD LT. OCHBACH

TO: CAPT. PHOMPSON

Captain:

I agree in the affirmative with your afirmative.

I am beginning the paperwork process immediatly. Clerk-Typist Obb estimates that creation and imposition of Private Subclass Alpha will require Forms 19-A through 19-Z, Form 19-AA, a medical opinion concerning whether B-7331 is alive in the technical meaning, and an original copy of his birth certificate.

Since he was grown in a mold and did not have a birth, I have requested a Certificate of Failure to be Born and / or an unmolding certificate. Central Records says this form was discontinued because too many enlisted men qualified.

I will proceed without it unless proceeding without it requires a form.

3RD LT. OCHBACH

[HANDWRITTEN ENVELOPE]

TO: CAPT. PHOMPSON

FROM: LT. OCHBACH

YES TO YOUR YES

TUBE DISPATCH: SENT 0940 / CENTRAL RECEIPT 0941 / DELIVERED 0943

= =

DOCUMENT 6 -- FINAL DISPOSITION

PERSONNEL DISPOSITION NOTICE

DATE TYPED: SHIP DAY 006 / 1616 HOURS

FROM: 3RD LT. OCHBACH

TO: CAPT. PHOMPSON

SUBJECT: INTERUM PUNISHMENT, B-7331

Captain:

The demotion paperwork has reached Personnel Classification, who returned it because B-7331's present rank is listed as PRIVATE, PASSED, HOSPITAL-RECYCLED, DISPOSED, and MISCELANEOUS on five seperate records.

Pending determination of which B-7331 is the legal B-7331, I have assigned him to extended Kitchen Patrol duty peeling potatoes.

The duty will continue until his demotion is approved, the company reaches Callisto, all potatoes are peeled, or somebody explains where the potatoes came from.

B-7331 reports for duty at 1700. He asked whether wrestlers eat potatoes. I told him this question proved the necessaty of the punishment.

3RD LT. OCHBACH

[HANDWRITTEN ENVELOPE]

TO: CAPTAIN PHOMSON

FROM: OCHBACH

FINAL REPORT -- NO REPLY NEEDED

TUBE DISPATCH: SENT 1616 / CENTRAL RECEIPT 1617 / DELIVERED 1619

[PENCIL NOTE IN CAPTAIN PHOMPSON'S HAND]

Ochbach is sitting right there.

CHAPTER SIX GREEN POTATOES - BO MEETS A WOMAN

The first green potato found Private B-7331 before Private B-7331 found love.

It lay in the bottom of a galvanized tub in Kitchen Station Four, concealed beneath two hundred ordinary potatoes and one stone that had passed inspection. Under the fluorescent lights its skin showed a rich, unhealthy green. A sprout curled from one eye like the finger of a very small corpse asking for assistance.

Bo held it up. “You're different,” he said, “Something I can relate to.”

The potato did not deny it.

Bo had been assigned to extended KP duty for attempting to clean a loaded rifle. The demotion to Private Subclass Alpha remained trapped in Personnel Classification, where officials were still determining whether a man recorded as disposed of and miscellaneous could legally be made less important. Until the issue was settled, Third Lieutenant Ochbach had ordered Bo to peel potatoes.

There were enough potatoes aboard the Arley Mith to punish an army.

The carrier's provision office had loaded them at Ganymede after requesting twenty tons of portable starch. Potatoes were portable, contained starch, and could survive military cooking without becoming visibly worse. They arrived in wooden crates stamped FOOD, SEED, INDUSTRIAL or DO NOT EAT. The galley mixed the contents to prevent favoritism.

Bo hated the normal ones.

Boiled potatoes made him gag. Mashed potatoes made him gag more efficiently. Raw white potato produced a wet, immediate reversal of his upper digestive system and a complicated burden for the colostomy pouch attached to the lower end. In his implanted memories, Granny's kitchen had contained pies, bread, apples, and a potato only when the plot of the children's story required something round to roll downhill. His brain therefore regarded potatoes as unfinished food.

The green potato smelled different.

Bo sniffed it. It smelled of soil, dust, cold storage and a chemical bitterness that the human nervous system had spent thousands of years learning to distrust.

He licked it. The bitterness delighted him.

Green potato skin contains chlorophyll, which is harmless and elevated glyco-alkaloids, principally solanine and chaconine, which are not. These compounds discourage insects, fungi, livestock, children and sensible privates. In sufficient quantities they cause burning in the mouth, abdominal pain, vomiting, confusion, weakness and occasionally death. Military food regulations therefore required green potatoes to be discarded or fed to personnel already listed as miscellaneous.

Bo bit into it. His mouth tingled. His eyes watered in opposite directions. His malformed digestive tract made an interested noise. He chewed thoughtfully.

“Mmm, good,” he decided.

The regular potatoes made him puke. This one merely tried to poison him. Bo appreciated restraint.

He slipped the potato into his left trouser pocket.

Thereafter he inspected the tubs with new purpose. Whenever a potato showed green skin, black sprouts, soft spots, or sufficient resemblance to something dug from beneath a haunted house, he hid it. One went into each breast pocket. Two went into the cargo pocket on his right thigh. A long one fit behind his belt. Another disappeared into the pale volume of his afro and remained there without support.

By the end of the shift, Bo carried fourteen pounds of future snacks.

The Arley Mith was coasting between Ganymede and Callisto. During pulse burns, acceleration came from nuclear explosions behind the stern. During the long coast, the central hull had no useful down. The carrier solved this with rotating habitation rings.

Each troop ring was a steel wheel roughly half a kilometer in radius, revolving around the ship's non-rotating spine. At 2.13 revolutions per minute, the rim moved at about 112 meters per second. Centripetal acceleration (angular speed squared multiplied by radius) pressed soldiers against the outer deck at approximately 24.8 meters per second squared, close to the familiar gravity of Jupiter's hab level.

The arrangement produced weight without producing a planet. It also produced hallways that curved upward in both directions. A soldier standing in one could see the floor rise ahead, the walls narrowing toward a ceiling that was really closer to the ship's axis. Doors and light fixtures followed the arc. Long corridors vanished not at a horizon but

behind themselves.

Bo understood none of the mathematics. He knew only that if he walked one direction he felt a little heavier, if he walked the other he felt a little lighter, and if he jumped while moving sideways the wall tried to meet him.

The change came from the Coriolis effect. Walking with the ring's rotation increased his tangential speed and therefore the apparent downward force. Walking against it reduced both. Moving radially, a.k.a. climbing a ladder toward the hub or stepping down toward the rim, deflected a body sideways because the body retained the rotational speed of the place it had left.

The Vacuum Corps explained this with a poster showing arrows.

Bo thought the arrows were evacuation routes.

After KP he left Kitchen Station Four and followed the curving hallway back toward the male-only quarters of the 9997th. His boots struck the deck with Jupiter-weight thuds. Potatoes shifted in every pocket. The one in his hair rolled deeper.

Bo walked against the rotation because it made the cast on his right arm feel lighter. At each step the ring turned beneath him. A ventilation grille approached from the left and seemed to slide upward. He watched it with his right eye. His left watched a door on the other side.

He did not watch the soldier coming around the curve and they collided headlong.

Bo bounced backward. The other soldier moved half a step and stopped. Three potatoes sprang from Bo's pockets. Two struck the floor, curved strangely under the ring's rotation, and rolled in opposite directions. The third struck the other soldier's boot.

Bo looked up.

She was six feet four inches tall and twenty stone, the same soldier-class dimensions as every enlisted man and woman produced for the Vacuum Corps. Her shoulders filled her uniform. Her hair was regulation straight and black. A clear inner eyelid flashed once across each eye and vanished. Her skin was tan, almost exactly Bo's shade where Bo was not black or bruised, stamped or potato green.

Two chevrons on her shoulder marked her as a corporal.

Bo's regiment contained only men. Until that moment the only woman

he remembered seeing was Granny, who had been elderly for the entirety of his artificial childhood and sometimes moved backward when the tape did.

The corporal was not Granny.

Bo became immediately and completely smitten. This sensation differed from artificial gravity. His stomach rose while the rest of him remained on the deck. His crossed eyes attempted to align and briefly overshot. His mouth opened. Saliva reached his chin before words reached his mouth.

More green potatoes fell from his pockets.

The corporal looked down at them, then up at Bo. “What in Jupiter's name is wrong with you, private?”

Bo considered this a promising start. “I got too many potatoes, maybe, or not enough pockets?”

“I can see the potatoes, idiot.” She kicked one aside. “You walked directly into an NCO. You are out of uniform, overloaded with unauthorized produce, leaning fifteen degrees against rotation and drooling on a government corridor.”

“Uh, I guess,” he muttered. “Uh, Corporal,” he added as an after thought.

“Corporal Rbra!” she barked.

“Yes, Corporal Rbra.”

She looked him over with the professional disgust of someone finding damage on equipment she did not own. “Serial?”

“B-7331.”

“Unit?”

“Nine-nine-nine-seven,” he said but then hastily added, “But I’m not a private,” anticipating her next question.

“Not a private what?”

Bo brightened. Here he possessed special information. “Private Subclass Alpha.”

Rbra stared at him. “That isn't a rank.”

“It will be, when they're done doing the paperwork.”

“I see.”

A potato dropped from behind Bo's belt and bounced between them.

Rbra's voice hardened. “Why you haven't been recycled is beyond me. Look at you. Your eyes don't agree. Your hair is the wrong color and lopsided. Your arm bends the wrong direction. You stand like a mooninite in a gravity well. Your uniform is on backwards. And don't get me started with those potatoes.”

“The green ones are the best.”

“Yeah... I think you mean poison."

Bo had never heard anyone speak so beautifully. “Do you like wrestling?” he asked.

Rbra's face went still. “What?”

“I know some moves.”

“What did you say to me, private?” She stepped closer, her agitation rising.

Bo could smell starch soap, machine oil, and cigarette smoke in her uniform. His knees weakened. Under two and a half gravities, this was structurally significant.

“You are an incompetent fool, private,” Rbra said.

“Sub class...” Be added before being cut off.

“You are contaminated,” she continued, “You are improperly trained. You are carrying toxic vegetables in seven separate locations, one of which I do not wish to identify. If your officers possessed the judgment Jupiter gave a canned ham, they would put you back in a mold, seal both halves and throw the mold into the nearest reactor.”

Bo nodded solemnly. “Yes, Corporal Rbra.”

“Stop agreeing with me.”

“Yes, uh... I mean... okay?”

Behind her, someone cleared his throat. It was not a loud sound. It did not need to be.

Rbra stiffened. Her heels struck together. She turned and saluted.

A sergeant stood a few feet up the curved hall. He was soldier class, six feet four and broad enough to block the corridor without assistance. His skin was white, his hair straight and black, and three chevrons marked each shoulder. Age had placed faint lines beside his eyes. Unlike the

newly manufactured soldiers, he wore his body as though he had lived in it for some time.

Bo saw the insignia and heard Rbra say, “Sergeant.” He concluded the man's name was Serj.

The sergeant returned the salute. “Corporal, continue your duties. I'll take care of…” he glanced at Bo’s stencils serial number on his fatigues, “Uh, B-7331.”

“Yes, Sarge.” Rbra gave Bo one final look suggesting he should die before requiring further correction. Then she marched away with the ring's rotation, each step making her momentarily heavier and, to Bo, more magnificent.

He watched until the curve took her boots, knees, shoulders and finally black hair from view, then sighed, wondering the next time she would grace him with her appearance.

The sergeant looked at the potatoes scattered across the deck. “What are you doing with all these green potatoes, soldier?” he asked.

Bo looked from him to the corridor where Rbra had vanished. Lying arrived without planning. “I'm recycling them for the woman, sir. The corporal woman, I mean. Uh…”

The sergeant raised one eyebrow. “You mean Rbra?”

“Yes, Serj.”

The eyebrow rose higher. After a moment of contemplation the sergeant whistled then said, “She's a tough cookie, that one. I advise you to steer clear of her, son.”

Bo swallowed. A fragment of green potato skin stuck briefly in his throat and then continued toward whichever parts of his digestive system were currently on duty. “I lied,” he confessed.

“Yes, I know.” The sergeant crouched and picked up one potato. He turned it beneath the corridor light. The skin was green enough to enlist.

“They're… uh, they’re snacks, sir.”

The sergeant tossed the potato over his shoulder then stood up. “Why'd you lie?” he asked staring directly into Bo’s crossed eyes.

Bo looked down the empty hall again. “Uh, I get that way around women, I suppose. Never met one until now.”

The sergeant's mouth moved slightly at one corner. He did not laugh. He

did not call Bo defective, contaminated, stupid or an administrative category. His eyes held something Bo had never seen directed at him: sympathy.

Bo did not know the word. He recognized the feeling as a sudden absence of danger.

“It happens to the best of us,” the sergeant said, nodding.

Bo studied him. “Do you know my Granny?”

The sergeant's expression changed. For a moment the curving hallway, the rotating steel, the green potatoes and Callisto waiting days ahead all seemed to quiet around them. “Sorry, kid,” he said, looking away. “Everyone knows your Granny.”

He placed the potato back in Bo's pocket. Then he patted Bo between the shoulder blades, directly over one of the vestigial muscles left by the mosquito contamination. The muscle twitched beneath his hand. “I wish you good luck at the deployment.”

“You too, Serj.”

“You’re going to need it,” the sergeant muttered under his breath as he walked away against the ring's rotation. His stride lightened as he went, and the curved floor slowly carried him out of sight.

Bo remained in the hallway for a moment, zoned out. After a bit, he gathered the remaining potatoes. One had rolled nearly fifty feet spinward before apparent gravity, friction and a bulkhead drain reached a compromise. Bo wiped it on his uniform and returned it to his pocket.

Then he looked in the direction Corporal Rbra had gone.

He had learned three important things. Green potatoes were good. Rbra was a tough cookie. And there was at least one person in the Vacuum Corps who knew Granny and did not immediately want him recycled.

Bo continued toward his regiment with fourteen pounds of poison and the first hope of his life.

CHAPTER SEVEN SECOND CHANCES - CALLISTO ORBIT

The Arley Mith had arrived in orbit around Callisto, which meant the soldiers could begin preparing to leave the relative safety of a ship powered by nuclear bombs.

In Combat Room Twelve, the men of Company C practiced bayonet dives.

A bayonet dive was performed by running fifteen feet, leaping from a padded springboard, extending a rubber rifle, and descending point-first onto a stuffed Saturnian. The rubber rifle bent. The stuffed Saturnian burst. The soldier rolled, recovered his weapon, and shouted an approved political conclusion.

The exercise had been developed after a battlefield report stated that high ground was advantageous. Training Command interpreted this to mean soldiers should attack from above whenever furniture permitted.

Company C was on its fourth stuffed Saturnian when a runner entered and called for B-7331.

Bo stood near the back, waiting for his turn. He held a rubber rifle by the barrel and had been studying the bite marks left by previous trainees. His pale afro still contained one dried potato sprout. The PASSED stamp had faded from his forehead but became readable whenever he sweated.

“Captain wants you in his office,” the runner said.

Every soldier nearby stopped talking.

Being summoned by a company captain was not necessarily bad. Captains issued commendations, assignments, punishments, casualty notices, and orders to report for events later described as unavoidable. The soldiers had learned that all five began with the same sentence.

Bo handed over his rifle. “Can I come back for the diving?”

“That’s above my paygrade, private,” came the reply.

Bo followed the runner out.

Captain Phompson's office occupied a compartment beside Company Records. It had once been a storage closet for atmospheric suits and retained the dimensions, odor, and emergency hooks. Third Lieutenant Ochbach's desk stood on the left. Captain Phompson's stood on the right. Eleven feet separated them.

The lieutenant's chair was empty while Captain Phompson was present and pacing.

Phompson was short even for a native Jupiterian: two feet three inches tall yet almost three and a half feet wide. His six-inch legs moved rapidly beneath him, giving the impression that the upper portion traveled by concealed machinery. Unlike most officers, Phompson seldom used a wheelie cart. He preferred to walk whenever witnesses were present and sit for several hours afterward in private.

At a side table, his secretary Obb filed her nails and chewed three pieces of gum. She appeared to have been doing both since the invention of military paperwork. A typewriter waited in front of her with one sheet inserted. Across the top she had typed MEMORANDIUM FOR.

Bo entered and looked around suspiciously. He looked behind the door. He looked under the lieutenant's desk. His eyes permitted him to search two additional directions without moving his head.

Phompson stopped pacing. “What do you think you are doing?”

“Looking for Lieutenant Ochbach.”

Phompson nodded. Ochbach had this effect on new recruites. “He's on forward assignment,” he explained, “So you can relax.”

Bo grinned.

The lieutenant's chair stood directly beside him. It was built for a native Jupiterian officer, with a seat two feet from front to back, nearly four feet wide, and six inches above the floor. Bo turned and lowered his twenty-stone body into it.

The result resembled a large child sitting in a small child's chair after both had been designed by different species. Bo's knees rose beside his ears. His hips occupied the armrests. The chair's casters spread outward with tiny cries of metal.

Phompson's face tightened. “Not that relaxed! Jesus!”

Bo jumped up. The chair remained attached to him for one step, then fell away and rolled into a filing cabinet.

Obb stopped filing long enough to watch it strike. She resumed with the other hand.

Captain Phompson crossed to his own desk. The desk was normal size because military furniture contracts did not recognize officer anatomy. Behind it stood an elevated chair and a small aluminum ladder.

Phompson climbed six rungs, turned with practiced care, and lowered himself into the chair. Only the upper third of him appeared above the desktop giving the impression of a normal sized human.

He pulled a wooden box closer so he could rest his elbows on it.

Bo turned to face him across the desk.

The captain hesitated. He opened a folder then closed it without peering iside. He examined Bo. He examined the folder again in case Bo had improved while he was not looking.

“B-7331,” he began.

“Yes, Captain.”

“Do you know why you're here?”

Bo thought. He had been told that officers valued direct answers. He gave the most direct answer recently supplied to him by J-4012 in the recreation room. “To rape and pillage the Saturnians because they deserve that.”

Obb's nail file stopped in midstroke.

Captain Phompson closed his eyes. “Who told you to say that?”

“J-4012.”

Phompson covered his eyes with one large hand and took a deep breath. A sigh followed that made his entire width decreased slightly. “You are here because we have arrived at Callisto and the regiment is preparing for combat. What J-4012 has described is neither your mission nor authorized terminology. If he uses those words again, tell him to report to Chaplain Services for vocabulary adjustment.”

“Yes, Captain.”

Phompson opened the top drawer of his desk and removed a dark wooden box stamped RESTRICTED TITANIAN IMPORT - DUTY PAID SOMEWHERE. Inside lay twelve cigars in silver paper.

Titanian cigars were contraband, enemy products, and highly fashionable among Jupiterian officers. Their leaves were grown under glass on Titan, cured in ammonia air, rolled by political prisoners or union craftsmen depending on the label, and smuggled across military lines in boxes marked medical suppositories. At least they were until Jupiter had blown the world up by nudging a minor moon into a crossing orbit.

Phompson selected one, clipped the end, and lit it with a desk lighter shaped like Jupiter crushing Saturn.

He drew smoke into his mouth and released it slowly.

Then he offered the box to Bo. “Cigar?”

Bo had never smoked a cigar. Captain Phompson had. This made acceptance seem educational. “Yes, Captain.” He chose the largest one.

Phompson clipped it for him. Bo placed it between his lips and watched the captain closely. Phompson drew. Bo drew. Phompson held the smoke in his mouth. Bo inhaled it into every available lung surface.

The cigar struck him internally. Bo's clear inner eyelids snapped shut. His nasal vacuum flaps sealed. Smoke exited through one nostril after the flap reopened, then through his mouth, then through an uncertain route that made his colostomy pouch inflate.

He coughed hard enough to strike the desk with his forehead.

Obb wrote something on a notepad.

Phompson waited.

After what appeared to be small seizure, the color in his face returned and Bo straightened. Tears ran from both crossed eyes. He put the cigar back into his mouth.

“You don't have to finish it,” the captain said.

Bo drew again, less deeply. The result was only catastrophic in the ordinary sense. “But I like it,” he rasped.

Phompson nodded. Perseverance was one of the qualities the Vacuum Corps admired most in men doing the wrong thing.

The captain opened the folder. “Your demotion is still in process, of course. Which leave me in…”

“Private Subclass Alpha,” Bo coughed between puffs.

“.. an awkward position. Yes. Well, personnel has not decided whether the rank exists, whether you exist, or which decision must come first. Until they decide, you remain technically a private.”

Bo smiled around the cigar. “That's technically higher I guess, but doesn’t sound as cool.”

“For the moment,” the Captain corrected. He turned a page. “As company commander, I am duty-bound to order every technically

available private into battle. I cannot exempt you for incompetence until your incompetence has been properly classified. Do you understand?”

Bo slowly shook his head. “Not one word, Captain.”

“Excellent. Then we agree on the record.”

Obb typed a sentence.

Phompson leaned forward. “Do you at least think you are competent enough to fire a rifle?”

Bo shook his head, slowly. “Well, I never actually got one to fire.”

“I read the report.”

“At least while I was holding it.”

Phompson stopped. “Explain that part.”

“It fired after I dropped it on the instructor’s foot.”

Phompson leaned even more forward. “Towards what?”

Bo shrugged. “The ceiling?”

“Was anyone injured?”

“The ceiling, I guess.”

Phompson nodded. He had already known the answer would be bad. The exact shape of badness was new but not useful.

“Very well. If rifle marksmanship is not among your abilities, what do you believe you have to offer the regiment in the way of combat skills?”

Bo thought very hard. He looked at the captain with one eye and the cigar with the other. Wrestling offered body slams, elbow drops, chairs, ropes, dramatic entrances, and the ability to remain unconscious until the referee reached nine. Rifle training offered sore shoulders.

He remembered the factory. Workers had stared at him. Rgaret had stared at him. Corporal Rbra had stopped in a hallway and cataloged his defects. “People seem to notice me,” he offered, “I could be a good distraction, I suppose.”

Captain Phompson smiled. It was the first fully sincere expression he had shown during the interview. “'Yes,” he said. “I think we are in agreement on that one.”

Bo sat straighter, though he was no longer sitting.

“That is why I am giving you a special assignment.”

“Special? Like cereal?”

“No.”

“Then like a secret mission?”

Phompson nodded. “Yes. Ideally. Do you know how to keep a secret, private?”

Bo became excited. His cigar bobbed between his lips. “A what?”

Phompson folded his hands on the wooden box. “I am assembling a unique company of special soldiers, like you Bo, selected from throughout the regiment. Each has demonstrated aptitudes similar to yours.”

Bo nodded like he knew what was going on. “Wresting!”

Elsewhere on the carrier, clerks were compiling a list from medical rejections, disciplinary files, unexplained survival reports, incomplete demotions, and one drawer labeled TROUBLE WE STILL OWN.

“It’s not my job to apply adjectives.”

“Cool,” Bo said.

“Think of it more like meat-shield duty.”

Bo's mouth began to water at the thought of meat. He’d tasted some a couple of days ago before a hot shot lance corporal yanked it off his plate. He took the cigar out of his mouth. “Did you say meat?”

“It is a tactical term.”

“As in tactical food?”

“Private.”

Bo considered this. “Is it cooked?”

Captain Phompson looked at Obb. Obb shrugged without interrupting her gum.

“Listen carefully,” Phompson said. “During the upcoming battle, your new company will advance first. You will lay down covering fire and draw enemy attention. While the Saturnians concentrate on you, the remainder of the regiment will surge forward.”

“Cool. How far?”

“Seventy-five feet.”

Bo waited for a larger number. None arrived.

The battle line on Callisto had moved back and forth across the same crater field for eleven years. General Staff had determined that a seventy-five-foot gain would place Jupiterian forces beyond a row of frozen waste cravasses, shorten the official front by twelve yards on the map, and permit a victory arrow to be printed without covering last year's victory arrow.

“Seventy-five feet is the regimental objective,” Phompson continued. “Your company will create the opportunity. It is an important assignment.”

“Will the Saturnians shoot at us?”

“That is the attention component.'

“Can we shoot back?”

Phompson took out his cigar and let out a big cloud of smoke. “That is the covering-fire component.”

Bo frowned. “Sound great, except I still can't fire a rifle. Do you think I’ll get up to speed in time?”

“No, you’re being deployed within the hour.”

“Oh, okay.”

“But it is acceptable since you will be issued used ammunition.”

Bo placed his dead cigar on the edge of the desk. “What's used ammunition?”

Captain Phompson spoke with the relief of an officer reaching a prepared answer. “Ammunition that did not fire the first time around and appears good enough to receive another chance.”

Used ammunition came from battlefield recovery teams, rifle ranges, rejected lots, damp magazines, dud-removal squads, and soldiers who pulled the trigger without achieving the desired administrative result. Each cartridge was wiped, inspected under a desk lamp, and sorted into three categories: MAY FIRE, PROBABLY WILL NOT FIRE, and APPEARANCE EXCELLENT. Meat-shield companies received all three in equal proportions.

That is what the pamphlet said that Obb handed Bo with the title “What you need to know about used ammunition.”

Bo couldn’t read and just shook his head at the pretty pictures.

“Some rounds have already been struck by a firing pin,” Phompson explained. “Others may contain weak lasing components, damaged primers, no usable fission material, two bullets, or bio-goo. You are not expected to identify which is which.”

“Do they get mad when they don't work?”

“The rounds?”

“The Saturnians.”

“That is what we hope to find out.”

Bo looked at the soggy burnt out cigar on the edge of the desk then up at the captain. He thought about the green potatoes in his footlocker, Corporal Rbra somewhere aboard the carrier, and the kind sergeant who had wished him luck.

He knew he wasn’t the greatest soldier but he felt he could do something. Granny was depending on him to protect Jupiter. The assignment and soldiers like him may be special but at least they were getting another chance, just like the ammunition.

Bo grinned. “I like second chances,” he declared.

Captain Phompson's smile disappeared. For a brief moment, duty, embarrassment, tobacco, and something resembling conscience met behind his eyes. Then the moment passed. He reached for a form. “Report to Special Company Assembly Bay Two in…” he glanced at his watch, “In three hours.”

“Yes, Captain.” Bo stood up straight and grabbed the used cigar from its spot on the desk.

“Bring your jet pack, rifle, helmet, winter kit, pressure suit, colostomy supplies, and anything you want returned to somebody else.”

“What about snacks?”

Phompson narrowed his eyes.

Bo saluted with the cigar still in his hand, reversed it, and pressed the burning end against his pale afro. The hair smoked but did not ignite. He corrected the salute, turned, and walked toward the door.

“B-7331,” Phompson called.

Bo looked back.

The captain appeared very small behind the normal-sized desk.

“Try not to clean the rifle.”

“Yes, Captain.” Bo left for his special assignment. Three minutes later he said, to no one, “Jet pack!”

CHAPTER EIGHT FOUR HUNDRED HOURS - CALLISTO OUT THE VIEW PORT

Bo Bovastein pressed his face against the porthole and waited for Callisto to come back.

The porthole occupied the blind end of a little-used corridor in the Arley Mith's outer troop ring. It was eighteen inches across, four inches thick, and crossed by wires embedded in the glass to prevent frost. A brass plate beneath it read OBSERVATION APERTURE 19-C LIMIT THREE MINUTES. The plate had been installed upside down.

Bo had been there almost three hours.

The corridor rotated with the habitation ring at 2.13 revolutions per minute. Every twenty-eight seconds the porthole swept through the narrow angle where Callisto filled the view. The moon rose from beneath the lower rim, hung in front of Bo's flattened nose for six or seven seconds, then slid upward and vanished behind the carrier's fixed spine, radiators, armor, pulse magazines, and other parts of the ship considered more important than scenery.

Bo did not move between appearances. His cheek flattened against the cold glass. A foggy oval formed around his mouth. Whenever Callisto vanished, he stared at his own reflection: pale afro, crossed eyes, fading red PASSED stamp, and the dark end of a Titanian cigar tucked behind one ear.

Then the ring turned and the moon returned.

Below him, Callisto looked like an old white ball dropped in ashes and then struck repeatedly with hammers.

The Arley Mith circled in an extremely low military orbit whose official period was approximately 2.44 hours. The precise figure changed whenever the navigation office changed Callisto's reference radius. At an altitude of only a few miles, a nearly circular orbit required about two and a half hours because Callisto's gravity was weak: its gravitational parameter was roughly 7,179 cubic kilometers per second squared, and its radius was about 2,410 kilometers. The carrier moved at approximately 1.72 kilometers per second, fast enough to cross a hundred-mile battle sector in under two minutes and slow enough for officers to point at it on maps.

The orbit was so low that mountain clearance appeared in the flight plan

as a recurring task.

Bo knew none of this. He knew the moon was there, then not there, then there again.

The Jupiterian military divided Callisto into four quadrants. The division was logical, useful, and named to make both qualities difficult to remember.

Callisto was tidally locked to Jupiter. It rotated once during each orbit, keeping the same broad hemisphere facing the planet at all times. That created a Jupiter-facing side and a non-Jupiter-facing side. At the same time, Callisto moved through its orbit with one hemisphere leading and the opposite hemisphere trailing, the way one side of a wheel moves into dust while the other leaves it behind.

Combine the two divisions and the moon became LJ, LN, TJ, and TN.

L meant leading. T meant trailing. J meant Jupiter-facing. N meant non-Jupiter-facing. LJ was the portion that both led Callisto through space and faced Jupiter. TN trailed through space while facing away. LN led without facing Jupiter. TJ faced Jupiter without having the courage to go first.

Military maps painted the quadrants different colors. The surface remained unimpressed.

During the first hour, Bo watched the LJ Quadrant pass below. It was darker than the trailing hemisphere, stained by sulfur compounds, metal-rich silicates, carbonaceous dust, and centuries of orbital rubbish impacting the side that met the traffic first. Natural meteoroids contributed enthusiastically. Derelict spacecraft contributed alloys, wiring, reactor ceramics, frozen crew compartments, casino shuttles, guidance computers, and paperwork that had achieved escape velocity.

All of it had been pulverized by impact and churned into the regolith.

In places the upper soil was less a natural surface than an archaeological layer of crashed transportation. Iron, nickel, magnesium silicates, titanium, glass fibers, carbon composites, and finely ground hull paint formed a dark, crunchy blanket several yards thick. The blanket was interrupted by bright patches of solid water ice where newer impacts had broken through the dirt.

From orbit, the distinction looked like mold on bread.

At the center of the LJ Quadrant sprawled Valhalla.

Valhalla was not a single crater with a rim. It was a vast multi-ring impact basin, its central bright region surrounded by concentric ridges and fractures stretching thousands of kilometers across the landscape. The rings resembled ripples frozen into ice at the instant a stone struck water, except the stone had released enough energy to reorganize a hemisphere and the water had been rock and ice reluctant to admit it could flow.

Ancient impact shock fractured Callisto's crust. The softer ice-rich layers below responded over time, lifting, relaxing, and leaving rings rather than one high wall. Later impacts punctured the pattern. Military trenches, landing fields, rail guns, crater bunkers, and arrows painted on the ice made smaller additions.

The Arley Mith passed almost directly above Valhalla.

For six seconds at a time, Bo saw the rings sweep across the porthole. Near the basin's inner zones, enormous ice spires rose from disturbed ground. Some reached a kilometer in height. They were blue-white on their sunward edges and black on the other side. Shells, thermal cycling, sublimation, impact excavation, and military blasting had sharpened them into towers too steep for ordinary vehicles and ideal for very short-lived sightseeing.

Bo imagined standing at the top of one with a cloth wing strapped to his arms.

“That'd be good for hang gliding,” he told the glass.

Bo did not know what hang gliding was. The phrase had survived on a damaged recreational tape while the activity had not. He imagined it involved hanging beneath something until gravity became bored.

Callisto's atmosphere was far too thin to support a glider. Outside temporary war-zone plumes, the gas surrounding the moon amounted to little more than individually ambitious molecules. A wing large enough to carry Bo in such conditions would have needed to cover several counties and move faster than the instructions.

Bo added hang gliding to his deployment plans.

Bright flashes appeared beyond Valhalla.

They came in clusters. White pinpricks bloomed, vanished, and left pale disks expanding across the ground. A larger flash turned the porthole's automatic filter black for two rotations. Others flickered red beneath the horizon.

These were the active battle zones.

Jupiterian and Saturnian forces exchanged tactical nuclear devices, shaped demolition charges, kinetic penetrators, buried plasma mines, heavy particle beams, and artillery shells containing arguments too energetic for correspondence. Individual flashes marked positions where soldiers had existed, vehicles had been parked, bunkers had been occupied, or commanders had believed one of those things might be true.

Bo watched in delight.

“Nice,” he said.

The porthole cleared. Another flash opened like a flower.

Bo had no mental scale for the carnage. From orbit there were no bodies, screams, or shattered pressure suits. There were only lights against dark ice, brighter than the incandescent sun lamps inside a hab and nearly as cheerful.

Someone approached behind him.

“There you are.”

Bo peeled one cheek from the glass and turned the other eye.

J-4012 stood in the corridor holding a thin book. He had been in Bo's original platoon, shared his interest in wrestling, and supplied much of Bo's knowledge about Saturnians. J-4012 believed Saturnians ate knees because they possessed none of their own, foamed while standing, and moved faster than seeing.Bo Bovastein pressed his face against the porthole and waited for Callisto to come back.

The porthole occupied the blind end of a little-used corridor in the Arley Mith's outer troop ring. It was eighteen inches across, four inches thick, and crossed by wires embedded in the glass to prevent frost. A brass plate beneath it read OBSERVATION APERTURE 19-C—LIMIT THREE MINUTES. The plate had been installed upside down.

Bo had been there almost three hours.

The corridor rotated with the habitation ring at 2.13 revolutions per minute. Every twenty-eight seconds the porthole swept through the narrow angle where Callisto filled the view. The moon rose from beneath the lower rim, hung in front of Bo's flattened nose for six or seven seconds, then slid upward and vanished behind the carrier's fixed spine, radiators, armor, pulse magazines, and other parts of the ship

considered more

The book under his arm was titled CALLISTO: A PRACTICAL INTRODUCTION FOR TOURISTS, TROOPS, AND SURVIVORS. A library stamp showed it had been due ninety-four years earlier.

“They said you're going to the special company,” J-4012 said.

“Meat-shield duty.”

“Sounds important.”

“We get used bullets.”

J-4012 nodded with genuine envy. His platoon received new ammunition, which lacked history.

“I came to wish you luck.”

“Thanks.”

They looked through the porthole together. Callisto appeared, vanished, and appeared again.

J-4012 held up the book.

“I learned to read at Ganymede.”

Bo looked impressed. “All of it?”

“Most words. The little ones are easier.”

During the layover, J-4012 had attended a casino literacy class after mistaking the sign FREE READING for FREE BETTING. He stayed because the instructor gave every graduate a pencil. The pencil was now behind his ear, sharpened at both ends because he had misunderstood efficiency.

“This book tells everything about Callisto,” he said.

“Does it have volcanoes?”

“I'll get to that.”

J-4012 opened the book near the middle. He had marked important passages with grease, folded corners, and a green potato peel.

“A day on Callisto lasts four hundred hours.”

Bo waited.

“That's a long day,” J-4012 explained.

Callisto rotated once every 16.69 standard days, the same period it required to orbit Jupiter. Sunrise to sunrise therefore took just over four hundred hours. A person standing on the surface would see the sun creep across the sky at roughly one fifteenth the speed familiar inside Jupiter's twenty-four-hour hab cycle.

“Morning lasts four days,” J-4012 said. “Regular days. Twenty-four-hour ones.”

“When do you eat breakfast?”

“All morning.”

“That's good.”

In military reckoning, dawn, morning, noon, afternoon, evening, and night each occupied blocks so long that soldiers could enter battle at breakfast and be veterans before lunch.

J-4012 traced a line with his finger.

“At noon it gets up to minus one hundred eight Celsius.”

“That's hot?”

“For Callisto.”

At the subsolar point, sunlight could warm exposed dark material to approximately minus 108 degrees Celsius. That temperature remained lethal to unprotected tissue but was warm enough to make certain trapped volatiles impatient. Xenon deposits in shadowed pores and impact fractures could vaporize or erupt when heat reached them, sending short-lived geysers above the surface.

Xenon was heavy, rare, and normally used in lamps, ion systems, anesthesia, and expensive mistakes. On Callisto it collected in cold traps over geological time until sunlight, impacts, drilling, or artillery encouraged it to leave.

As the carrier rotated, Bo saw thin jets rising from the trailing side. Sunlight caught them at an angle, turning them into silver fans hundreds of meters high.

“What're those?”

J-4012 looked at the wrong page.

“Municipal fountains.”

Bo accepted this.

The moon vanished behind the carrier spine.

When it returned, the surface had grown lighter. They were crossing toward the trailing hemisphere, which accumulated less forward-facing impact debris and held more exposed frost. Frozen carbon dioxide brightened plains and crater floors. Patches of water ice showed through in hard white plates. The regolith still contained shattered spacecraft, but these tended to be vessels overtaken from behind or backing up without a signal.

The large Asgard impact region lay in the LN Quadrant, on the leading but non-Jupiter-facing side. Smaller than Valhalla but still enormous, it displayed concentric rings, disrupted terrain, and craters superimposed like revisions on a report. The military used its outer ridges for long-range artillery because every direction from the center qualified as outward.

J-4012 turned another page.

“The trailing side's got carbon dioxide.”

“The fizzy kind?”

“Frozen fizzy.”

“Can you drink it?”

“Only once.”

In ordinary terrain, carbon dioxide remained frozen or existed as an exceedingly thin gas. In war zones, energy changed the rules. Tactical nuclear bursts, plasma weapons, reactor fires, impact penetrators, and the friction of large machinery could raise local surface temperatures from approximately minus 108 Celsius to around minus 78 Celsius.

Minus 78 Celsius was still cold enough to freeze a careless sentence, but it approached the sublimation temperature of carbon dioxide under suitable local pressure. CO2 frost flashed directly into gas. Buried deposits erupted through cracks. Great white plumes formed above impact pits and trench systems.

Bo had seen these from the porthole without understanding them. On the trailing side, several geysers rose together. The bases were lost in gray surface dust. Their upper plumes spread like luminous trees and bent under Callisto's slow rotation, incoming debris, and shock waves from nearby fighting.

Where enough CO2 entered a basin faster than it escaped, a temporary

local atmosphere formed. It remained thin by human standards and eager to leak into space, but from the surface it could be seen as a faint blue haze along the horizon. Dust and tiny ice crystals scattered shorter blue wavelengths through the gas. For a few hours or days, soldiers could look sideways and see that they were inside something.

Then the gas froze, drifted away, or was blown somewhere else by another battle.

“The sky turns blue when the war gets hot,” J-4012 read.

“Minus seventy-eight is hot?”

“It says so.”

Bo pressed his face to the glass again. A blue line edged one crater basin. Above it, flashes pulsed through vapor clouds.

“Pretty,” he said.

J-4012 looked more closely. “Those are people shooting.”

“Pretty cool?”

The porthole swept away.

J-4012 continued reading during the dark intervals.

Callisto's surface gravity was approximately five percent of Jupiter's familiar pull and about one twentieth of the artificial gravity in the troop ring. A twenty-stone soldier who stepped onto the moon would retain all his mass but weigh about thirty-nine pounds. He could jump several times higher, carry heavy weapons, and discover that landing on ice remained a separate problem.

The escape speed was roughly 2.44 kilometers per second. Artillery shells could not leave the moon, but artillery officers continued trying.

Beneath the crust lay mixtures of water ice and rock. Deeper still, some models suggested buried layers where salts and pressure allowed liquid water to persist. The military classified the possible ocean as a naval theater and assigned it a commander before confirming it existed.

Radiation at Callisto was lower than nearer Jupiter, one reason large bases and long wars were practical there. The magnetospheric environment still punished electronics, exposed personnel, and any film badge whose owner wished to sleep well.

Impact craters covered nearly everything. Callisto had not resurfaced itself through widespread volcanism or tectonic renewal. Its landscape

preserved old violence beneath new violence with unusual efficiency.

Bo listened carefully until J-4012 paused.

“Yeah, that's cool,” Bo said, “but where are the volcanoes?”

J-4012 searched the index. He found volatile, victory, and visitor sanitation. There was no volcano. “This isn't Io,” he said.

Bo's expression fell.

Io had volcanoes in his implanted childhood only when the surviving tape remembered them, but the idea mattered. A moon was supposed to have something large, hot, and unnecessary coming out of the ground. Callisto possessed ice spires, xenon fountains, carbon dioxide weather, nuclear flashes, crushed spaceships, four hundred-hour days, and a possible ocean beneath the crust. None of these compensated for the absence of lava.

Callisto appeared again below them.

Valhalla's rings curved toward the horizon. A tactical flash lit an ice spire from beneath. A CO2 plume rose on the trailing edge of the view. For a moment the whole moon seemed to contain every kind of violence except the kind Bo wanted.

He made a decision. “I'll figure out how to put volcanoes here someday.”

J-4012 considered this. “That sounds hard.”

“But it would be sooo worth it, right. Did I mention I get second chances?”

The ring carried Callisto out of sight.

J-4012 wished Bo luck again and returned to his platoon. Bo remained at the porthole until a military policeman enforced the three-minute limit two hours and fifty-eight minutes late.

Below, Callisto completed another fraction of its four-hundred-hour day, unaware that Private B-7331 had promised it volcanoes.

CHAPTER NINE AGLUND GIVE A SPEECH

The soldiers had assembled in a hallway ten miles long and only sixty feet wide, which the Department of War called a hall because calling it a hallway would have made the fire regulations applicable.

It occupied most of the carrier's deployment ring, a separate rotating structure beneath the habitation rings where the drop ships were berthed nose-down in armored cradles. The deck curved upward in both directions until it disappeared behind ranks of helmets, shoulders, rifles, and men. No soldier could see either end. This created an impression of limitless military strength and concealed the fact that the last quarter mile had been closed because somebody had stored landing gear in it.

The ring turned at its own combat-loading rate. It provided a little less than Jupiter-level gravity, partly to accustom troops to Callisto's surface and partly because one bearing had begun smoking over Ganymede. Thousands of magnetic boots scuffed against the deck. Ventilators dragged warm air, weapon oil, rubber seals, cigarette smoke, disinfectant, and the deep mammalian odor of ten thousand frightened soldiers around the circle every eleven minutes.

All active troops aboard CVBN-66743, the Arley Mith, were present: what remained of the 9997th and its attached regiments, replacement battalions, assault engineers, medics, demolition teams, traffic-control infantry, and several hundred men whose orders had become detached from them during resupply. They stood in companies along painted deck sectors. Each wore a combat pressure suit with the helmet tucked beneath one arm and a rifle secured beneath the other. The effect was solemn, martial, and somewhat spoiled by the manufacturer's yellow warning tags still hanging from many of the suits.

At the center of this human ring stood Lieutenant Colonel Rchibald Aglund.

Aglund was a gray-haired old native Jupiterian and commander of the active regiments. Both his legs had been blown off during the Third Administrative Correction of Io, though a stranger might not have noticed. His torso was so broad and his uniform descended so far around it that he resembled a decorated ottoman. He traveled on his knuckles with a rolling, deliberate gait, planting one enormous fist and then the other while the lower half of his body followed obediently behind.

He had refused prosthetic legs on the grounds that only pussies walked

around on fake legs.

A small staff followed him. One assistant carried his medals in a velvet tray because Aglund's tunic could no longer support all of them. Another carried a field microphone connected to the hall speakers. A third carried a silver flask and had been ordered not to give it to the colonel under any circumstances except requests, threats, gestures, eye contact, or thirst.

The commencement speech had begun twelve minutes earlier and was already in difficulty.

Aglund walked six paces on his knuckles, remembered he could not speak into a microphone that was six paces behind him, and stopped. The microphone assistant hurried forward and placed it near his mouth.

“MEN,” said Aglund.

His voice struck the metal walls and traveled both ways around the ring. A second later it returned from behind him as a diminished but still authoritative “MEN.” Several regiments turned in the wrong direction.

“And miscellaneous authorized women,” he added after being handed a card. “And any pending classifications. I am proud to have been your leader through these two long weeks.”

He lowered the microphone, walked another six paces, and waited irritably until the assistant caught up.

“In those weeks I have watched you grow from confused reborn soldiers into confused older soldiers. I have watched you train, drill, clean weapons, lose weapons, find different weapons, and learn the difference between the enemy and most classes of civilian.”

A murmur of pride passed through the hall.

“Soon the Arley Mith will open her deployment locks. You will board your assigned drop ships. Those ships will disengage from this ring in groups of forty, fire their braking engines, descend through Callisto's temporary combat atmosphere, if any, and deliver you to the surface of that ignoble moon.”

He moved again. The microphone assistant stumbled over a coil of cable and had to crawl beneath two staff officers to reach him.

“Some ships will deliver you nearer the surface than others,” Aglund continued. “This is within the accepted statistical meaning of deliver.”

The first few ranks cheered. Farther down the hall, where the speakers

were half a second late, the cheer became uncertain and then stopped.

“You will land in the LJ quadrant along a front extending two hundred and nineteen miles. Your objectives have been clearly marked on maps that will be distributed as soon as somebody locates the correct pallet. Until then, follow the men in front of you. If they turn around, shoot over their shoulders.”

A major whispered urgently into Aglund's ear.

“No, I was told two hundred and nineteen.” The colonel covered the microphone with one hand, which was approximately the size of the microphone assistant. “What do you mean kilometers? Why would anybody mark miles on one side and kilometers on the other?”

The major whispered again.

Aglund uncovered the microphone. “The important thing is that you are going down there to fight for Jupiter. You will advance against the Saturnian positions with courage, discipline, and the firm knowledge that each of you has cost the government slightly less than your equipment.”

The soldiers looked at their equipment.

“I will not conceal the danger from you,” Aglund said, although three members of his staff began signaling that concealment was precisely the next paragraph. “Callisto is a difficult theater. The average service life of a fresh soldier after entering an active combat zone is approximately four minutes.”

Ten thousand soldiers became so quiet that the ventilators could be heard chewing on a loose rag somewhere beyond Sector Blue Nine.

The colonel consulted the speech in his assistant's hand. “Uh, that figure is an average, naturally. Some of you will last considerably longer. This is balanced by those who are killed before the timekeepers start their watches.”

A captain lunged for the microphone. Aglund pivoted away on one fist with surprising elegance. “For morale purposes,” he went on, “you will be pleased to know that only thirty-one percent of battlefield casualties are expected to be permanent.”

A ripple of relief moved through the troops.

“The rest are fatal.”

The relief went back the other way.

“Now, you may have heard rumors concerning drop-ship losses. The official rate is not forty percent. Forty percent includes ships that return under their own power while on fire, and those are counted as operational successes. The true unrecoverable loss rate is a very respectable twenty-three percent, provided we exclude vehicles that cannot be located.”

Behind him, a staff officer quietly removed the silver flask from the third assistant. Aglund had another flask in his sleeve.

“Your pressure suits are rated for vacuum, radiation, flying ice, chemical smoke, and fragments moving at up to three thousand feet per second. They are not rated for direct nuclear attack, indirect nuclear attack, close nuclear attack, distant nuclear attack, or the blue light which appears before certain classified nuclear attacks. If you see the blue light, close your eyes. This protects the retina for identification purposes.”

Somewhere among the engineers, a soldier raised his hand.

“Questions will be answered after victory,” Aglund said. “Complaints will be answered after the war. Claims for missing limbs must be countersigned by… nevermind, you get the picture.”

It was at this point that Bo Bovastein arrived.

He entered through a maintenance hatch in the rear of the hall, carrying nothing but a paper assignment slip and half of a green potato. He had spent the first half of the speech in the wrong deployment ring, waiting beside a laundry shuttle because its sign said DROP LOAD HERE. A sympathetic machine operator had eventually read his orders and pointed out that military drops generally involved fewer bedsheets.

Bo found Company Z at the very back, where six soldiers occupied enough marked floor space for two hundred. The enormous empty rectangle around them had once belonged to Company Y, which had boarded its drop ships early by mistake and was presently circling Callisto without a pilot.

Company Z had been assembled from special cases throughout the regiment. Its official strength was one hundred and forty-four. Its present strength was seven, including Bo, though one member's status depended on whether the medical department ultimately classified his undeveloped vestigial second head as a soldier, a dependent, or government luggage.

There was Private H-8810, a narrow soldier whose bones had been grown to cavalry specifications and cracked whenever he saluted. Private

M-205, whose right arm possessed excellent military discipline but whose left arm had a mind of its won and preferred to flip the bird rather than salute. Private Q-1?, whose final serial digit had smeared during hatching and whose pay had therefore been going to three different men. Private N-0000, a broad, silent figure marked AMBIGUOUS on every document connected with him. Private C-4439, who had such a poor attitude that two psychologists had resigned rather than finish describing it. Last came Private T-18, who could see perfectly in darkness but became functionally blind whenever anything was illuminated.

They were, as Captain Phompson had promised, special soldiers.

Bo grinned and high-fived H-8810. Something clicked in H-8810's wrist.

“Good to be here,” Bo whispered.

“You're late,” said C-4439.

Bo high-fived him too. Only then did Bo notice their clothes.

Every member of Company Z wore a sealed combat pressure suit. So did every soldier visible ahead of them, all ten thousand, ranked along the curve until they merged into a wall of armored backs. Helmets rested beneath arms. Jet packs rose between shoulder blades. Gloves were locked to wrists. Radiation tabs, ammunition clips, emergency sealant, waste tubes, navigation beacons, and last-message recorders hung from webbing in carefully standardized disorder.

Bo looked down at his fatigues. He wore two boots, trousers, a shirt, and the expression of a man who had just discovered a fifth season. “Did I miss something?” he wondered aloud.

Bo unfolded his assignment slip. Beneath REPORT TO COMPANY Z, a clerk had written SUIT ISSUE FIRST in red pencil. Bo had assumed this meant the first suit issued would be his and that it would eventually arrive.

Before Bo could contemplate the significance of descending onto an airless, radioactive moon in a cotton shirt, a voice rose from somewhere ahead.

“FOR GRANNY!”

It came from one soldier, far around the curve. Perhaps he had shouted “For Ganymede.” Perhaps he had shouted “Forward, regiment.” The hall's ancient speakers clipped the first syllables, amplified the last ones, and threw the result around the rotating ring.

Another voice answered, “FOR GRANNY!”

A platoon took it up. Then a company. The words rolled along the hall faster than the delayed loudspeaker signal, gathering thousands of voices as they came.

“FOR GRANNY! FOR GRANNY! FOR GRANNY!”

Boots hammered the curved deck. Rifle stocks beat against armored chests. Ten thousand newly minted soldiers shouted until the bulkheads trembled and dust fell from conduits that had passed inspection that morning.

The fear left them. The four-minute life span, the missing maps, the burning drop ships, and every improperly disclosed percentage vanished beneath one enormous, useful noise. Men who had been wondering whether their wills required witnesses now wanted nothing more than to descend immediately and do something violent in the general direction of Saturn.

Lieutenant Colonel Aglund lowered his microphone. His speech, like many government programs, had succeeded only after everyone stopped listening to it.

Bo's eyes filled with tears.

He had always known Granny was important. She had raised him, inspected him, confused him, and been the only person from his childhood whom he could remember with dependable affection. But he had never imagined that ten thousand other soldiers loved her too. Some of them must have known her before him. Perhaps Granny had raised all of them. It would explain why she was so tired.

Bo joined the chant with the half potato held over his head. “FOR GRANNY!”

The chant became deafening. Aglund's face had gone red with emotion, alcohol, or circulatory obstruction. He seized the microphone in both hands. “THAT'S THE BLOOD I WANT!” he roared.

His staff looked at one another.

He reared up on his knuckles, swayed magnificently, and pointed down both directions of the curving hall at once. “GET TO YOUR DROP SHIPS!”

The ranks broke. Ten thousand soldiers surged toward the boarding sectors. Company markers toppled. Helmets bounced. Rifles rose above

the flood. The curved hall became a river of pressure suits flowing in both directions toward numbered locks while departure sirens began to howl beneath the cheering.

Lieutenant Colonel Rchibald Aglund smiled, attempted to salute, and passed out before his hand reached his forehead.

His staff caught him by the shoulders and dragged him toward a recessed equipment bay. Without his legs he was comparatively easy to move, although his medals required a separate detail. They pulled him clear just before the first wave of troops thundered across the place where he had fallen.

Bo was swept forward with Company Z, still in fatigues, still holding his potato, and still believing that an entire army was going to war for his Granny.

CHAPTER TEN REJECT PARTS IN SUPPLY CLOSET 10

Bo had traveled approximately ninety feet with the stampede before remembering that Callisto did not have enough air for his shirt to work.

The realization came while ten thousand soldiers divided around a row of armored columns and flowed into the drop-ship access corridors. Company Z was somewhere immediately ahead of him, identifiable by the uneven rhythm of H-8810's cracking bones and the occasional obscenity from C-4439. Bo tried to keep up, but the current turned him sideways and carried him past a soldier wearing a jet pack.

It was a beautiful machine. Two polished thrust cylinders rose behind the soldier's shoulders. Fuel lines crossed a compact armored frame. Directional nozzles hung at the hips like metal fists, and a control grip had been built into each glove. Yellow letters on the tanks read PERSONNEL MANEUVER UNIT - DO NOT POINT AT FRIENDLIES.

Bo forgot about suffocation. “Hey,” he called. out “Where can I get one of those?”

The soldier did not slow down. “Supply closet 10. Two decks down.”

“Okay. Don't go anywhere without me.”

The soldier and Company Z went one way. Bo went the other.

He ran against the troop flow until he found a ladderwell, descended two decks, crossed beneath a rack of drop-ship fuel umbilicals, descended another half deck by accident, climbed back up and followed three signs marked SUIT ISSUE. Two pointed in opposite directions. The third had been installed upside down but proved correct.

The supply closet was wedged between Drop-Ship Airlocks 184 and 185. It had originally been a room of ordinary rectangular dimensions. Later expansions had pinched it into a long steel wedge, six feet wide at the entrance and eighteen inches wide at the rear, where obsolete helmets were stored according to how firmly they could be kicked in.

The corridor outside was filled with airlock noise. Warning bells rang. Pressure doors slammed. Pumps drew cabin air into recovery tanks with a howl like industrial wolves. Every few seconds a drop ship released from its berth beyond the bulkhead, and the deck shook as though the carrier had remembered something embarrassing.

A sign over the supply entrance said CLOSED FOR ACTIVE INVASION.

Bo approached the entrance door. It was a swoosh-style personnel door designed to open at a soldier's presence with a clean, reassuring motion. Instead it produced a low error sound. BWOOP.

A red panel displayed: ISSUE PERIOD ENDED 00:15:37 AGO. PLEASE REQUIRE EQUIPMENT EARLIER.

Bo waved at it.

BWOOP.

He tried approaching from the side.

BWOOP.

He backed away and ran at it in case the door respected confidence.

BWOOP.

Beside the entrance was another door marked EXIT ONLY. It remained operational so the last fitted soldiers could leave. Bo watched it carefully. After a moment it swooshed open, discarded a helmeted private into the corridor, and snapped shut behind him.

Bo understood that doors had timing, just as wrestling moves did. You waited for the opening. You committed your weight. You entered before your opponent could recover.

The exit door opened again. A soldier came through carrying three gloves and a grievance form.

Bo lunged too soon, struck the soldier chest-first, apologized, backed away, and lunged too late. The door caught him across the ribs.

Its safety system detected an obstruction and responded in the approved manner by closing harder. Bo turned sideways. The panels compressed his chest, hesitated, then attempted to shear his belt buckle off. He inhaled, although this made him wider, and squeezed through with a sound normally associated with removing a cork from a bottle.

The door snapped shut on the loose end of his assignment slip. Bo pulled. Half the paper came with him. The other half remained outside, officially attached to the corridor.

Inside the closet, the noise dropped from catastrophic to merely military. The walls trembled, but conversations could be understood if shouted directly into the proper ear.

At the fitting counter, an NCO supply clerk was trying to finish with the final soldier.

The clerk was sub-Master Sergeant Vub, a compact Jupiterian whose thick neck seemed to rise directly into the back of his head. He wore a canvas apron, a measuring tape, a sidearm, and the expression of a man who had spent his career issuing life-preserving equipment to people determined to misunderstand it. A wooden baseball bat rested beneath the counter with SUPPLY ADJUSTMENT TOOL burned into the handle.

The soldier in front of him was tall and yellow, with close-cropped hair and arms of visibly different lengths. His right hand reached almost to his knee. His left ended several inches higher. He scratched at the base of his neck with one hand, failed to reach the same place with the other, changed hands, and complained continuously.

“This one pinches,” he complained.

“It does not pinch,” replied Sergeant Vub.

“It pinches my neck.”

“That is the pressure seal.”

“Then the pressure seal pinches.”

“That means the pressure is trying to get out. That’s good.”

The soldier wore the torso of a combat suit but no arms. Vub lifted a left sleeve from a bin, compared it with the soldier's left arm, threw it aside, and selected another. Suit components were issued separately because soldier bodies were grown separately and did not always arrive at the same conclusions. The torso ended in four reinforced zippers: two at the shoulders and two at the hips. Sleeves and legs locked onto these with pressure gaskets, electric contacts, coolant couplings, and ordinary metal zipper teeth added by a committee member who trusted what he understood.

Vub attached the sleeve. It ended four inches beyond the soldier's fingers.

“Too long,” said the soldier.

“Grow into it.”

“But we're deploying now.”

“Then grow quickly.”

Bo stepped up to the counter. “I need a space suit, boss.”

Vub did not turn. “Can’t you read? The sign says closed.”

“Not very well,” Bo replied, “Thanks for noticing. And a helmet please. Preferably a nice shiny one.”

“More closed.”

“Oh yeah, and a jet pack.”

Vub turned then.

The unequal-armed soldier looked delighted to have a second person available for conversation. “You Company Z?”

'Yeah. I’m Bo, but you can call me B-7331.”

“Z-96. Jak.”

They high-fived. Jak used his long arm, which gave the gesture enough travel to become a slap. Bo liked him immediately.

“You like wrestling?” Jak asked while trying to fold and refold a rejected sleeve.

“Does su-flex hurt? Duh!”

“Right on, bro!” Jak held up his hand for a high five and Bo accepted the invitation.

“I also like savory pies,” Bo added. “Meat, onion, mushroom, eel. Not fruit. Fruit in a pie is a trick.”

“Green potato pie, maybe?”

Bo’s jaw dropped. “You like green potatoes too?”

Jak thought about this with great seriousness. “Only with cheese.”

Sergeant Vub placed both hands on the counter. “The supply station closed fifteen minutes ago. You fella’s need to move it along now.”

“I was at the speech,” Bo explained. “I and noticed everyone one had a nifty space suit except for me.”

Vub was not amused.

“Can I have a suit now?”

“No.”

“Please?'

“I said, no.”

Bo leaned closer. “Please. It's for Granny.”

Vub's face changed. The chant had reached the supply decks through the loudspeakers, troop corridors, ventilation shafts, and one improperly closed communications circuit. He had listened to it for six minutes while trying to fit Jak's arms.

“Oh for Granny? Why didn’t you say so before?”

Bo smiled. Finally, he was getting somewhere with this guy.

Sergeant Vub reached beneath the counter and brought out the baseball bat. “If one more soldier says Granny to me, I am going to issue him this.”

Bo looked at the bat. “What size is it?”

Vub raised it.

Bo did not flinch. He had never seen a baseball game and assumed the object was a measuring tool with unusually persuasive markings.

Jak scratched his neck again. “He can have my rejects.”

On the floor beside him lay a collection of failed suit components. There was a faded orange torso with a white medical-service stripe painted halfway across it, one short blue arm, one long gray arm, a green left leg, and a yellow right leg whose knee joint had been installed backward. The components came from four suit generations, three manufacturers, and at least one moon with incompatible electrical standards.

The torso was missing most of its ablative armor plates. Combat pressure suits normally carried overlapping ceramic-and-carbon tiles across the chest, spine, shoulders, thighs, and groin. When struck by a laser, a tile sacrificed itself by boiling away and carrying heat with it. The process was effective, lightweight, and reassuringly named, though repeated hits in the same place eventually ablated the soldier.

Jak's reject torso retained one plate over the left shoulder blade and half a plate over the abdomen. A sticker beside the empty chest sockets read ARMOR SOLD SEPARATELY AFTER FIRST USE.

“Granny says, no,” grumbled Vub, gathering the parts in both arms. He carried them to the narrow end of the room, and shoved them into a disposal chute. The yellow leg resisted because of its backward knee. He folded it with the bat and forced it through. A metal flap clanged shut.

“There,” he said. “Inventory reconciled.” He left through the service exit. The door swooshed open, accepted him, and closed with the satisfied sound of a machine completing a difficult bowel movement.

Jak continued getting dressed. “Well,” he said, “that didn't work.”

Bo knelt beside the chute. “It's only disposal. It’s not really trash until it hits the decontamination sprayers.”

He found the maintenance latch and opened the lower panel. Behind it was a shallow collection drum that should have carried rejected equipment to the recycling grinders. The conveyor had stopped. A paper tag inside explained that the recycling grinders were temporarily unavailable due to recycled grinder parts.

Together they fished out the suit. Jak's long arm reached the orange torso. Bo pulled out the short blue sleeve, the long gray sleeve, and both legs. The yellow leg unfolded suddenly and kicked him in the stomach. He sat down, considered this an encouraging sign of mechanical life, and began dressing.

The parts zipped together after only moderate argument. The blue sleeve ended above Bo's wrist. The gray sleeve covered his hand completely until Jak cut a hole through the palm with a can opener. The green leg was too short and drew Bo's left boot against his toes. The yellow leg was too long and bent outward at the backward knee, giving him a permanent half-crouch on one side. The orange torso sealed around his body but left a triangular opening beneath his right armpit where two generations of zipper had failed to meet.

Jak repaired the opening with emergency pie foil from his pocket and a strip of pressure tape leaving a rippled texture.

“Cordoroy?” Bo asked.

“Best kind.”

When they finished, Bo looked like four traffic regulations fighting over one pedestrian. He flexed his arms. The suit hummed, flashed a blue service light, and reported LEFT LEG UNKNOWN. The remaining ablative plate slid from his abdomen and struck the floor.

Bo picked it up and put it in his pocket for later.

He still had no helmet. He also had no jet pack, which bothered him nearly as much.

“Come on,” said Jak, “We're late.”

The final clearance alarm changed pitch. Somewhere beyond the wall, an airlock opened and the room pressure dropped enough to make their ears pop.

“Do you think Company Z will leave without us?” Bo asked.

“Not a chance,” replied Jak, “We’re brothers.”

They exited through the swoosh door and ran toward the giant hall. Jak's suit fitted him correctly everywhere except the arms and neck. Bo's suit fitted nowhere, but its mismatched control circuits disagreed about this and therefore displayed an overall readiness status of AVERAGE.

The deployment hall had emptied. Ten thousand soldiers had become scattered loads aboard hundreds of drop ships. Abandoned company markers lay across the curved deck. A few stragglers sprinted between access corridors while loaders collected dropped helmets, rifles, and one sleeping lieutenant whom everybody had mistaken for luggage.

Loudspeakers called assignments into the echoing ring.

“COMPANIES R THROUGH T, REPORT TO BERTHS TWO-TWENTY THROUGH TWO-THIRTY. COMPANY W, YOUR DROP SHIP HAS BEEN FOUND. COMPANY Y, REMAIN IN ORBIT UNTIL FURTHER NOTICE.”

Bo and Jak stopped beneath a directory board.

“Where's Z?” Bo asked.

“At the end,” the bored staff member replied.

They looked both ways. The hall curved out of sight in both directions, making every direction an end if pursued with sufficient confidence.

“COMPANY Z, FINAL CALL, BERTH ONE-NINETY-SEVEN. COMPANY Z PERSONNEL NOT ABOARD IN TWO MINUTES WILL BE LISTED AS EARLY CASUALTIES.”

“That's us,” Jak said.

They ran.

Jak had locked his helmet in place before leaving supply. It was a standard combat model with a transparent faceplate, twin oxygen ports, internal radio, and a padded neck ring that pressed against the place he had been scratching.

After fifty yards he scratched at it through the suit glove. “My neck still itches.”

“Maybe it's finally growing in,” Bo suggested.

Jak started to hyperventilate. “Help me get this off!” he cried between

gasps.

They slowed beneath Berth 193. Jak turned his back and bent forward. Bo found the helmet release tabs. One was marked LIFT. The other was marked DO NOT LIFT UNTIL FIRST TAB RELEASED. He could not tell which message belonged to which tab because Jak's shoulder armor covered half the words.

“Twist left,” Jak said.

Bo twisted left.

“My left.”

Bo twisted the other way. The locking ring clicked but did not release.

“Pull up,” Jak said.

Bo pulled.

The helmet resisted. Bo planted the long yellow leg behind him, braced the short green one against a deck seam, and pulled harder.

He did not know his own strength. No one had ever measured it accurately because the first dynamometer had broken and the second technician had blamed the first technician.

There was a wet mechanical pop and the helmet came free.

So did Jak's head.

Bo stood in the empty deployment hall holding both of them. “Oops,” he said.

CHAPTER ELEVEN BERTH TWELVE - JAKS FINAL WISH

Jak's head blinked at Bo from inside the helmet.

There was no blood. Bo checked because he had recently been told that blood was important and because the absence of it made the situation feel less rude. Jak's face remained its usual yellow color behind the transparent plate. His eyes moved. His mouth worked. A faint green readiness light glowed beside his left ear.

“Uh...” Bo said slowly.

“Did you get it off?” Jak asked. His face was slowly going from yellow to blue.

Bo rolled the helmet in his hands so Jak could see the headless body standing in front of them. “Most of it.”

He turned the helmet over. The bottom was capped by a stainless-steel seal where Jak's neck should have continued. The seal had expanded from the helmet ring in a tight spiral, overlapping itself like the shutter of an armored camera. A soft membrane bulged beneath it. Thin silver tubes disappeared into the edge of the spiral and pulsed at different rates, preserving blood flow, air pressure, nerve chemistry and the government's investment.

Combat helmets were equipped with emergency cranial isolation systems. In the event of a catastrophic neck breach, shaped charges cut away damaged tissue while the spiral shutter closed from both sides. The helmet then maintained the head for up to eight minutes, or twenty-two minutes if the soldier refrained from smoking. The corresponding suit shutter sealed the torso to prevent loss of atmosphere and fluids. This feature had been added after military studies found that soldiers frequently survived explosions in two individually recoverable pieces.

Bo did not know any of this.

“Hey,” Jak said. “The itching's gone.”

“Are you sure?”

Jak smiled. “Yeah.” His smile weakened. “Wait. I can't feel my body.”

The body remained upright for another second while the balance mechanism waited for its gyro to stop spinning. Then the knees unlocked. Jak's headless body fell sideways and struck the curved deck with a rubbery metallic crash.

Its neck was capped by a matching stainless-steel spiral. The suit spoke from somewhere in the chest.

Bo looked from the body to the helmet. “Uh, Sorry about that, pal.”

“No, it's okay,” Jak said. His voice sounded tinny through the helmet speaker. “The helmet did its job. Can you reattach me before, you know...?”

“Yeah, of course. Anything for you, buddy.”

Bo set the helmet on the suit's neck. The two spiral seals touched but nothing happened. He rotated the helmet clockwise. The face turned toward the floor.

“Wrong way,” Jak said.

Bo rotated it counterclockwise. The face turned toward the ceiling.

“Other wrong way.”

Bo found three recessed tabs around the neck ring. One was marked ALIGN. One was marked MEDICAL AUTHORIZATION ONLY. The third had lost its label and looked friendlier than the others. He pressed it.

The suit gave a sharp warning tone. “ILLEGAL OPERATION. THIS ACTION WILL BE REPORTED TO YOUR SUPERVISING OFFICER.”

“Don't press that one again,” Jak said with a wheezy chuckle.

“HEAD SUPPORT RESERVE: FIVE MINUTES.”

Bo tried holding the helmet down with both hands. The neck ring resisted, then compressed under his weight. A hidden mechanism struck the bottom of the helmet and launched it upward. Bo watched it fly through the air.

“ILLEGAL OPERATION. THIS ACTION MIGHT CAUSE DANGEROUS GASSES TO VENT INTO THE BREATHING SYSTEM.”

Jak's eyes followed the ceiling lights as Bo steadied him. “I don't think you're doing it right,” he said slowly between long gasps of air.

“I know.”

Jak took what passed for a deep breath. “Hey, I know this is a lost cause, but before, you know... well before I die, I want you to do me a solid.”

Bo had no idea what that meant. “Sure, anything buddy,” he said, nodding nervously.

“Take this helmet and..."

“Yeah?”

"I want you to take it and then shove it down the throat of a pinko Saturnian.”

Bo considered the helmet. Then he considered the probable dimensions of a Saturnian throat, about which he had received several incompatible descriptions. “Uh. Okay.”

“It's for Granny.”

Bo smiled. Anything for her. “Yeah. For Granny.”

The deployment hall had nearly emptied around them. The distant roar of soldiers had become the scattered slap of individual boots. Company markers lay abandoned on the deck. Berth doors shut one after another along the curve, each closure followed by alarms, pressure cycling, and the heavy impact of a drop ship releasing into space.

Bo looked down both directions of the hall. Company Z was nowhere in sight.

A thin clerk hurried past carrying a stack of departure sheets and a portable stamp. He had the wild, inward expression of a man whose paperwork was leaving faster than he could document it.

Bo stepped in front of him, holding Jak's helmet under one arm. “Where's the berth for Company Z?” he demanded.

The clerk had processed Companies E, F, G, two different Hs, and something officially designated Ampersand. He had never heard of Company Z. He did not want to begin hearing of it now.

He said the first number that entered his mind. “Twelve.”

“Thanks.” Bo ran toward Berth 12.

The clerk continued toward Berth 241, briefly pleased with the efficiency of his answer.

Berth 12 was almost half a mile around the deployment ring. Bo ran with the long yellow suit leg making broad strides and the short green leg making hurried ones. Jak bounced beneath his arm, face outward, watching empty corridors, sealed doors and direction signs pass in a tilted blur.

The reserve light beside Jak's ear turned red. “How much farther?” he asked.

Bo squinted his crossed eyes at the passing signs. “I can see twelve.”

“Uh, that was one-twelve.”

“It has twelve in it.”

“Keep going.”

By the time Bo reached the actual Berth 12, one line of soldiers remained. They wore dark pressure suits without regimental markings and carried compact tool cases instead of rifles. Each had a white retrieval beacon fixed to the chest and a folded casualty sack strapped across the back.

Bo joined the end of the line and tapped the shoulder of the soldier ahead of him. “Is this the line for the special distraction company?”

The soldier glanced at Bo's mismatched suit, then at the helmet containing a living head. “Do you mean extraction,” he asked.

“Uh. I guess.”

The soldier raised an eyebrow then turned back.

The line moved. One by one, the extraction troops lowered helmets over their heads, locked the neck seals, and stepped through the boarding door. An automated reader scanned each suit and displayed names, medical certifications, next-of-brood codes and preferred body-bag orientations. Bo's suit displayed LEFT LEG UNKNOWN and was ignored as a transient equipment fault.

Jak's voice had become quieter.

“You still there?” Bo asked.

“Yeah.”

“Good.”

“Can't see much.”

“We're getting on a drop ship.”

“Good.”

“Then I'll find a Saturnian.”

Jak managed a weak grin. “Use both hands.”

The final extraction soldier reached the door. He lowered his helmet, sealed it, and boarded. Bo copied him. He raised Jak's helmet over his own head then remembered it wasn’t exactly empty. “Oh, right. Sorry.”

Jak did not answer. His red reserve light had gone dark.

A warning above the berth door began counting down from twenty seconds.

Bo looked around. Beside the berth stood a refuse chute labeled LOOSE ORGANIC MATERIAL - NO AMMUNITION. It was narrower than the disposal chute in supply but had a spring-loaded flap.

Bo carried the helmet over and turned it upside down. Jak did not come out. The spiral seal held him securely in place.

Bo shook the helmet. Nothing. He slapped the side. Jak rotated a quarter turn. He reached beneath the spiral shutter, found a small manual-release lever and pulled it. The steel seal opened in six overlapping petals with a damp click.

Jak's head dropped into the refuse chute. It struck the flap, rolled once, and disappeared into the carrier's organic recovery system. The chute displayed MATERIAL ACCEPTED: 6.3 KILOGRAMS OF PROVISIONAL NUTRITIONAL VALUE.

Bo stood at attention. “For Granny,” he whispered. As he saluted, one tear ran down his cheek and fell into the open helmet.

The berth countdown reached five seconds.

Bo placed the empty helmet over his head. It fitted Jak's longer neck poorly and rested against Bo's shoulders with the internal padding several inches too high. He twisted the locking ring. The mismatched suit considered the seal, rejected it, reconsidered and finally approved it for training use only.

The boarding door closed. Bo reached it one second later.

Through the small window he saw the drop ship withdraw from its cradle. Its docking arms folded. Thrusters flashed. Berth 12 became an empty rectangle of stars with Callisto rising beyond it.

“Ah crap,” Bo muttered.

CHAPTER TWELVE BO LOADS PAYLOADS INTO A DROP SHIP

Bo looked down the hall. Other berth lights still glowed farther around the ring. There were hundreds of drop ships. They were all going to the same moon. Bo saw no reason he could not get aboard another one and meet Company Z on the surface. This was, in its broadest astronomical sense, correct.

He followed the sound of voices and clanking metal. The voices came from somewhere beyond the next curve of the deployment hall. The clanking came in irregular bursts: wheels striking deck seams, crate corners meeting bulkheads, chains tightening and people expressing professional opinions about all three. Bo hurried toward it in his mismatched suit, helmet crooked on his shoulders and backward yellow knee kicking outward every third step.

A maintenance elevator opened ahead of him.

Corporal Rbra emerged pushing a hand truck. Two olive-gray crates were strapped to it beneath a stenciled warning: FIELD MEDICAL SUPPLIES - NOT FOR COMBAT USE. She leaned her six-foot-four soldier-class body into the load and rolled it across the hall without looking in Bo's direction.

Bo stopped. His heart performed several wrestling moves against the inside of his chest.

Rbra turned down an access lane toward a broad loading ramp. Bo followed at a careful distance, attempting to make his multicolored pressure suit resemble part of the machinery. When she glanced back, he hid behind a fire cabinet that covered approximately one quarter of him. When she looked forward again, he continued.

A front-end loader stood beside the ramp. It was a low, wide vehicle with armored tires, lifting arms and a scoop designed for moving cargo, wreckage, regolith or indecisive personnel. Bo passed behind it and lost sight of Rbra.

He leaned around the rear wheel. She was gone. He wanted to scratch his head but couldn’t figure out how to through his helmet.

“What are you doing?” she said behind him.

Bo spun around. Her mouth moved, but the helmet blocked the sound. Jak's helmet had been built for a longer neck and its internal speakers

rested against Bo's jaw instead of his ears. All he heard was a soft electrical murmur and his own breathing.

“What?” he shouted.

Rbra said something else.

Bo unlocked the helmet and lifted it off.

“Oh,” Rbra said, disappointed. “It's you.”

She looked him up and down. The orange torso, blue arm, gray arm, green leg, yellow leg, pie-foil pressure patch and absence of ablative chest armor appeared to confirm several of her suspicions. “I thought you were recycled or something.”

“Nope. Still here.”

More soldiers arrived from the maintenance elevators and cargo passages. They came in ones and twos, each pushing a hand truck loaded with crates. There were ammunition cases, battery packs, ration modules, medical chests, field radios, portable heaters, tent anchors, replacement suit limbs and one refrigerated container marked OFFICER COMFORT ITEMS - COMBAT PRIORITY. There seemed to be a great deal of cargo and remarkably few soldiers.

Rbra frowned at Bo. “Why are you at my berth?”

Bo understood that the truth had not worked especially well for him in the past several minutes. He selected a lie involving the kindest authority figure he knew. “Serj told me to be here.”

“Sergeant who?”

“Serj.”

Rbra's eyes narrowed. Behind her, a crate slipped from a hand truck and landed on a loader's foot. The loader began hopping in the low Callistan deployment gravity provided by the ring, which gave him time to complete each curse before coming down again.

Rbra was in a hurry. “Fine,” said said, “Stop standing there. Take those two aboard.”

Bo seized a hand truck.

The ramp descended into a circular opening in the aft end of the drop ship. From the hall it looked like a two-meter-wide hole cut into the floor, surrounded by seal lights and thick docking collars. The ship itself extended away beneath the deck, held vertically on its aft section in the

carrier's berth structure. Its stern was pressed to the airlock. Its nose pointed outboard, three hundred and fifty feet away, where the deployment ring waited to throw it at a moon.

Bo pushed the crates down the ramp.

A standard Jupiterian troop drop ship was approximately three hundred and fifty feet long and twelve feet in diameter. It had the proportions of a sharpened sewer pipe and the comforts of ammunition. The cylindrical hull was built around six troop columns arranged in a hexagon around a narrow central core. The core ran almost the full length of the ship and permitted noncommissioned officers, wiring bundles, coolant pipes and fowl smells to move fore and aft.

The columns were not rooms. Each was a vertical magazine of soldiers.

Combat suits hung from shoulder mounts fixed to sliding racks. In the berth position, with the ship lying on its back, the racks formed stacks. One soldier lay above another, each separated by less than an inch of armored suit shell, like cartridges in an enormous magazine. Once the ship launched and weight disappeared, the stacks became hanging columns. The soldiers dangled from their shoulder fittings while their boots floated beneath them and the rack guides prevented them from becoming a thousand-person wind chime.

Military literature compared the arrangement to a honeycomb. Enlisted troops compared it to a Pez dispenser, except that Pez was issued one piece at a time and rarely screamed.

Each column held between one hundred fifty and one hundred seventy-five troops depending on suit thickness, regimental optimism, and whether the loading officer counted men whose feet extended past the marked line. Six full columns gave the drop ship a nominal capacity of one thousand soldiers. Nominal capacity was the number achieved before anyone required room for ammunition, oxygen, medical gear, toilets or second thoughts.

The hard outer shells of the combat suits made the arrangement possible. Each soldier carried his own pressure, cooling, waste connections and approximately forty minutes of combat rated air circulation. The drop ship did not need to provide individual seats, couches or cabin atmosphere during descent. It merely kept the suits from colliding too energetically and supplied common oxygen lines so the troops would arrive with their personal tanks still full.

Bo reached the bottom of the ramp and entered the central core.

It was barely wide enough for the hand truck. Pipes and cables crowded the walls. Numbered rack mouths opened on six sides around him. Five of the columns had been converted to cargo. Crates filled their frames from stern to bow, locked into the same shoulder catches intended for soldiers. Ammunition occupied two columns. Rations, batteries, medical equipment and replacement parts occupied three more. Only the sixth held troops.

A hundred and sixty soldiers lay stacked on their backs with helmets tucked against their chests, each staring upward at the armored backside of the soldier above. They were an engineering unit assigned to unload the cargo, provided the cargo did not unload them first. But no one knew that of course.

Bo lowered his crates down using the existing block and tackle system set up by someone else.

The ship was berthed aft first because the stern airlock was its only practical cargo entrance. The cockpit lay at the far end, in the pointed fore section. Every crate therefore had to travel through the central core past the entire payload. This was inefficient, but moving the cockpit to the back had been rejected after pilots complained they preferred to see the object they were about to hit.

As Bo advanced, he passed rack labels, oxygen manifolds, emergency cutting tools and small instructional plates. One read IN EVENT OF COLUMN JAM, DETONATE SHIP. Another read DO NOT FEED THE PAYLOAD WHILE IN MOTION.

Rbra moved ahead of him, assigning crates to open rack positions. As payload wrangler, she was responsible for troops, cargo, load balance, rack locks, life-support hookups and discovering after launch why the manifest weighed twenty tons less than the ship.

“Medical to column four,” she called. “Batteries forward. Ammunition stays aft of frame seventy unless you want the cockpit to become the slow part.”

Bo helped lift a crate into a rack. His long gray sleeve caught beneath it.

Rbra released the clamp before it took his arm along with the cargo. “Pay attention,” she ordered.

“I am.”

“To the crate.”

“Sorry.” He paid attention to the crate until Rbra moved away, then paid

attention to Rbra.

The officers aboard the carrier would not be coming with them. Jupiterian officers generally directed surface combat from orbit, where maps were flatter, coffee remained in cups and every order could be blamed on radio delay. Once the troops descended, noncommissioned officers became the highest-ranking people expected to encounter the actual war.

Four NCOs were assigned to each drop ship: pilot, copilot, navigator and payload wrangler. The titles implied four separate professions. In practice, all four were qualified to perform any task except admit that another one knew how.

At the end of the central core, Bo reached the cockpit.

Cramped was generous. The pointed hull narrowed around four flimsy seats, each made of webbing stretched across metal tubing. Over complicated instrument panels covered the forward bulkhead, both walls, part of the ceiling and one location beneath the copilot's left knee that could only be read during a crash. There were two rectangular windows. A cluster of small CRT screens displayed the carrier, Callisto, trajectory marks, rack pressures, clamp status and a cartoon moon that frowned whenever the navigation solution became fatal.

All four NCOs wore combat suits with their helmets off. The helmets were clipped to the cockpit ceiling, where they swung gently with the ring's vibration and struck one another like hollow bells.

Bo recognized the pilot. It was the white-skinned sergeant who had been kind to him in the hallway, the one who had warned him about Rbra and patted him on the back. Bo still believed his name was Serj.

The sergeant sat in the forward-left seat, broad hands resting on two control yokes while he watched cargo figures crawl across a display.

“Hi, Serj,” Bo said, with a wave.

The sergeant looked back. Recognition moved slowly across his face, followed by concern. “No more yapping,” he said. “More loading.”

“Yes, Serj.”

The copilot sat beside him. He was a sharp-faced corporal named Bliv who looked as though he had been grown five minutes before boarding and had used all five minutes to become alarmed. He held a laminated pre-flight checklist in both hands.

“Primary bus?” Bliv asked.

“On,” said the sergeant.

Bliv studied the control panel. “Which one is primary?”

'The one marked primary.”

“There are three.”

“Pick one.”

Bliv moved a switch. Six red lights appeared. “Was that supposed to happen?”

“Who knows,” the sergeant said, busy with his own checklist.

Bliv returned to the beginning of the checklist. He had already returned to the beginning nine times. Each restart changed the order in which the mistakes occurred and therefore constituted training.

The navigator occupied the rear-right seat. He was a black-skinned staff sergeant with silver-framed sunglasses, though the cockpit contained no sunlight and very little light of any kind. His name patch read MOE. He reclined with one boot hooked beneath the console and smoked a cigarette with a rock steady head. Ash fell into the navigation keyboard. He brushed it aside without looking.

Everyone else was working. Moe looked cool.

Bo decided he needed sunglasses. Sunglasses would make the orange torso seem intentional. They might also help with women and being taken seriously while wearing one yellow leg.

“Trajectory?” the pilot asked.

Moe exhaled smoke. “Callisto’s still there,” he said without consulting a single readout or display.

“Release solution?”

“Retrograde window in six minutes, nineteen seconds.”

“Impact corridor?”

“Mostly ours.”

The cartoon moon on the screen frowned but did not scream.

Drop ships had no main engines. Engines required fuel, pumps, combustion chambers, maintenance and pilots capable of piloting them. The Department of War had eliminated all five by turning the carrier's

deployment ring into an orbital slingshot.

The Arley Mith traveled around Callisto at roughly 2.44 kilometers per second. The drop ring rotated in the same plane as the orbit. At the release point, the selected berth moved backward (retrograde) relative to the carrier. When a drop ship released, it inherited the carrier's orbital motion minus the ring's backward tangential speed.

In an extremely low orbit, only a small reduction was required to turn a circle into an ellipse that intersected the surface. A drop of ten kilometers needed only a few meters per second of retrograde velocity. The ring supplied much more, generally between sixty and one hundred ten meters per second, depending on load and how recently everyone had emptied their bowels. This produced a steep, rapid descent and reduced the time available for the enemy to shoot, the crew to reconsider or the navigator to finish his cigarette.

The maneuver was commonly described as being hurled downward by centripetal force. Physicists objected that the ship was actually released tangentially with reduced orbital velocity and then fell along a ballistic path under Callisto's gravity. The military agreed to call the physicists from orbit and ask again after landing.

Small maneuvering thrusters rotated the drop ship, corrected its corridor, and prevented it from entering Callisto nose-first. They could not return it to orbit. Landing energy was handled by an ablative belly, disposable crush structure, solid braking cartridges used during the final seconds and whatever atmosphere ground combat had temporarily manufactured. The cartridges were officially classified as landing equipment rather than engines because they fired only once and could not be steered away from a mistake.

Bo understood none of this. He understood that the control panel looked extremely cool.

He made three more trips through the central core. He loaded rifle cartridges that had failed once and been approved for a second chance. He loaded medical sealant, compressed oxygen, frozen stew, portable trench roofs and a crate marked LIVE GUIDANCE COMPONENTS that barked when tilted.

Rbra counted every item. The sergeant watched the mass display. Bliv restarted his checklist. Moe lit a fresh cigarette.

At last the final crate locked into column five. Rbra dragged the empty hand truck up the ramp, kicked it into the carrier corridor then sealed

the stern hatch. The inner door closed, six locking dogs rotated and pressure equalized with a deep metallic groan.

“Payload secure,” Rbra called down the central shaft. She squeezed through the core to the cockpit and took the rear-left seat.

All four NCOs pulled their helmets from the ceiling clips and locked them onto their suits. Their voices moved to the radio circuit.

Bo stood between the seats, his helmet firmly in place. “Where's my seat?” he asked.

The sergeant slowly turned in the pilot's chair. His helmet made the movement more deliberate and much more terrible. “What the hell are you still doing in here?” his voice came over Bo’s helmet radio.

“I'm coming with you. I missed my drop ship.”

Rbra stared at him. “I thought you told me the Master Sergeant ordered you here.”

Bo looked at the sergeant, then at Rbra. There was little time left for another lie, and his education tapes had not prepared him to maintain two at once.

“I lied,” he said. “Because I'm madly in love with you.”

The cockpit became silent.

Rbra's face hardened into something that could have ablated a laser.

Staff Sergeant Moe began to laugh. It started as a cough around his cigarette, grew into a wheeze, and then became helpless, full-bodied laughter. His sunglasses slipped down his nose. He struck the navigation panel with one glove and accidentally improved the impact corridor by two miles.

Corporal Bliv looked from Bo to Rbra, lost his place on the checklist and instinctively grabbed the nearest lever, which happened to be marked DOCKING CLAMPS - RELEASE ONLY AT RETROGRADE INDEX. Fortunately, the retrograde index light was green when Bliv pulled it. The odds of this happening by chance was 1 in 360.

The clamps opened. The deployment ring ceased being a roof. The carrier dropped away. Six cargo columns, one column of soldiers, four NCOs, Bo and several hundred tons of military necessity were flung tangentially into a Callisto-intersecting orbit.

Bo rose from the deck as gravity vanished. His backward yellow knee

unfolded. Behind him, the loaded crates strained against their rack locks. Ahead of him, Callisto expanded across the portholes.

Moe continued laughing.

CHAPTER THIRTEEN THIRTY SECONDS - COMING IN HOT

The first missile passed close enough to make the drop ship ring like a struck pipe.

A white line crossed the forward screens. Something flashed behind them. The hull shuddered, the cargo racks groaned, and a red light appeared on Corporal Bliv's control panel beneath the words EXTERNAL EVENT.

Bo floated above the copilot's seat with one hand caught in an overhead cable bundle. His helmet drifted beside him, turning slowly. He watched three more bright lines rise from Callisto's patchwork surface.

“Are those missiles or lasers?” he asked.

Nobody answered.

Serj held the pilot's seat with his knees and studied the tactical display. Rbra gripped the payload console, watching column pressures and rack locks. Moe sat behind his sunglasses with one boot hooked under the navigator's panel. The cigarette in his mouth produced a thin ribbon of smoke that bent toward the cockpit ventilator.

Only Bliv appeared disturbed.

“The controls are changing,” he said.

“They're supposed to,” Serj replied.

“Before my eyes.”

“Where else would they change?”

The control panel reorganized itself as the drop ship descended. Orbital displays gave way to atmospheric displays. Atmospheric displays gave way to terrain. Terrain displays moved aside for missile warnings. Buttons changed colors, labels shortened, and switches that had been important in orbit withdrew beneath safety covers so Bliv could not use them on the ground. The system had been designed to reduce pilot workload by ensuring that no control remained where the pilot had learned it.

Bliv stared at it. “That one said cooling a second ago. Now it says countermeasures.”

“Then don't cool anything with it,” said Serj.

A tone sounded. Moe glanced at a screen.

“Two radar tracks. One optical.”

“Missiles?” Bo asked.

No one answered.

Serj reached into a thigh pocket and removed a dented silver flask. He unlocked the drinking port in his helmet seal, raised the flask beneath it, and swallowed.

He offered it to Moe.

Moe took a measured drink and passed it to Rbra. Rbra tipped it back, swallowed once, and returned it across the cockpit.

Bo followed the flask with his eyes.

Serj saw him.

“Not him,” he said.

“I didn't ask yet.”

“I'm saving time.”

Serj returned the flask to his pocket. From another pocket he produced a Titanian cigar in a narrow glass tube. It was dark, hand-rolled, and expensive enough to be listed on the cargo manifest as navigational equipment. He bit off the end, spat it toward a waste intake, and lit it with a chemical igniter built into his glove.

Blue smoke filled the helmet until the ventilator found it. Serj puffed twice and pressed a guarded switch.

Panels opened along the drop ship's hull. Bundles of metallic strips burst outward into vacuum and the first traces of Callisto's temporary atmosphere. Each strip was tuned to reflect radar at a slightly different frequency. The cloud expanded behind them as thousands of false targets, all apparently shaped like drop ships and all piloted more competently than Bliv.

Two warning tracks curved away.

The optical missile did not care about radar.

Moe watched it climb. “Still coming.”

Serj sighed around the cigar, placed one hand on the control stick, and waited.

The missile rose from the dark terrain as a bright point. Its guidance system aimed ahead of the falling drop ship. Serj allowed it to correct once, twice, then moved the stick half an inch. Maneuvering thrusters fired along the starboard hull. The ship slid sideways several meters without meaningfully changing its descent.

The missile crossed the space they had occupied and continued upward toward the Arley Mith, where it became an officer problem.

Serj released the stick and resumed smoking.

Bo smiled. “That was cool.”

“Quiet,” said Rbra.

Below them, Callisto expanded from a moon into terrain.

The leading-side surface was charcoal, brown, and dirty white: ancient impact ice buried under metal-rich silicates, sulfur compounds, and generations of pulverized spacecraft. Craters overlapped craters. Military roads cut pale lines through the regolith. Fresh excavations exposed water ice in hard geometric patches that could not be mistaken for geology because geology rarely used right angles or filed requisitions.

Bright flashes moved across the ground. Some were artillery. Some were tactical nuclear weapons. Some were drop ships arriving with more enthusiasm than control.

Bliv began touching the panel.

“Don't,” said Serj.

“I have to stabilize the dynamic descent matrix.”

“No, you have to keep your hands where I can see them.”

Bliv pressed a yellow button. The cockpit lights went blue.

He pressed it again. They went red.

He pressed a second button. A recorded voice announced that the galley was secure.

“The controls are alive,” Bliv said. “They're moving away from me.”

“Stop pushing them.”

Bliv lunged for a row of flashing switches.

“Stop him!” Serj shouted.

Moe unhooked his boot and came out of the navigator's seat. Bo pushed

off the bulkhead. Together they reached Bliv as he unfastened his harness and attempted to pursue a control label across three screens.

In zero gravity, removing a panicked copilot from his chair was less a wrestling match than a disagreement among furniture. Bliv grabbed the stick. Moe caught his wrist. Bo wrapped both arms around his torso and applied what he believed was the Callistan Neck Fold, modified to avoid the neck because of recent experience.

They drifted into the ceiling.

“My checklist!” Bliv cried.

The laminated checklist floated past Moe. He folded it once and placed it in Bliv's collar.

“Your checklist is secure.”

Moe produced a roll of gray duct tape from his suit belt and handed it to Bo.

All military space suits carried duct tape. Officially it was pressure-rated composite repair ribbon. Unofficially it was the only component known to be compatible with every generation of Jupiterian equipment and personnel.

Bo wrapped the tape around Bliv's upper arms and chest. He went around six times, partly for safety and partly because the roll traveled nicely in zero gravity. Bliv's arms became fixed against his sides.

Moe pushed him toward the rear bulkhead and secured him beneath an emergency handrail.

“The controls are alive,” Bliv continued. “They know I can see them. The green one became an arrow. The arrow became a number. The number was looking at me.”

Bo opened Bliv's helmet visor.

“What are you doing?”

Bo placed a strip of tape across his mouth.

“Mmmph!”

Bo closed the visor.

Bliv continued explaining the situation, but it became a private radio program inside his helmet.

Moe returned to the navigator's station, reclaimed his cigarette, and

brushed a loose strip of tape from his sunglasses.

Bo pulled himself into the empty copilot's seat.

The flimsy webbing creaked beneath him. He drew the harness over his mismatched suit and stared at the control panel. Hundreds of lights moved across it. Terrain maps rolled beneath targeting brackets. Countermeasure status changed every second. The cartoon moon had stopped frowning and was now covering its eyes.

Bo reached toward a glowing switch.

“Don't touch anything,” Rbra ordered.

He folded his hands in his lap.

A cluster of ground-launched missiles rose toward them. Serj puffed his cigar, released another chaff cloud, and nudged the ship between two guidance solutions. One missile detonated against the decoys. Fragments struck the stern in a burst of metallic rain.

Rbra watched the payload display. “Column two lost an ammunition latch.”

“Secondary?” Serj asked.

“No.”

“Put it on the landing report.”

“If we land.”

“Then we won't need the report.”

Moe adjusted a navigation dial. “One minute to troop corridor.”

Bo looked through the screens.

The gritty surface rushed closer. He could distinguish troop movements now: dark streams advancing through trenches, vehicles crossing crater floors, infantry spreading around impact ridges. Firefights stitched white and red lines across the ground. Artillery impacts lifted regolith in slow fountains. Farther away, enormous ice spires rose against a blue-and-black horizon, some nearly a kilometer tall, their sunlit edges bright above the temporary atmospheric haze.

Other drop ships descended around them.

There were dozens at first. Long cylinders fell nose-high along converging corridors, maneuvering thrusters blinking. Ground missiles climbed to meet them. One drop ship broke in half near the horizon. Its

cargo section continued downward while its cockpit went somewhere more ambitious. Another vanished inside a white flash. A third rolled sideways, recovered, and released a glittering stream of objects from its hull.

Bo leaned forward.

The objects were soldiers.

They tumbled through the thin air, arms and legs spread, rifles turning beside them. More soldiers spilled from another damaged ship. Some struck one another. Some disappeared behind smoke. One continued falling with a cargo rack still attached to his shoulders.

Bo pointed and opened his mouth.

“Thirty seconds to deployment,” Serj announced.

Rbra reached above her head and pulled a red ejection cord.

Bo heard six heavy locks release down the length of the ship.

The troop column opened.

One hundred and sixty soldiers dropped into the sky.

They left the shoulder racks in sequence, aft to fore, like cartridges leaving the bottom of an enormous dispenser. For a moment they simply fell: armored bodies scattered through black sky and blue haze, rifles clutched to their chests.

Bo stared in horror.

“You murdered them!”

No one answered.

Then the jet packs fired.

Small thrusters ignited behind the soldiers in staggered flashes. Guidance vanes unfolded. The falling column spread into squads, each soldier steering with control grips built into his gloves. They rolled upright, accelerated away from the drop ship, and descended toward the battle line in a widening formation.

Rifles came forward.

The first squad opened fire while still hundreds of feet above the surface. Muzzle flashes strobed around their helmets. Return fire climbed from trenches below. Soldiers banked between it, jet packs drawing brief white lines through the haze. One spun around an ice outcrop, fired

downward, and disappeared into a crater with three others close behind.

It was airborne infantry in the most literal and least sustainable sense.

Bo sat back in Bliv's seat and enjoyed the show.

His eyes widened behind the crooked helmet. His hands tightened around the harness. For several seconds he forgot Company Z, his missing ablative armor, the missiles, the rapidly approaching ground, and the fact that he still did not have a jet pack.

“Wow,” he said. “This is so much cooler than wrestling!”

Rbra gave him the evil eye.

Bo's smile faded. “What?”

“It's your turn, buddy boy.”

Bo looked at the open troop-column indicator. Then he looked at the jet-pack icons moving away across the tactical display. Then he looked at the empty space behind the cockpit where one hundred and sixty soldiers had recently stopped being passengers.

He swallowed as he realized what she meant.

Moe reached across from the navigator's station, took Bo by both shoulders, and lifted him out of the copilot's seat. In the weak deceleration gravity, Bo came free like a large, badly dressed piece of luggage. Moe handed him to Rbra without removing his sunglasses.

“Nice cigar,” Bo said to Serj as he passed the pilot's seat.

Serj raised it in acknowledgment. “Thank you.”

Rbra hauled Bo out of the cockpit and down the narrow central core. He bounced off cargo racks, oxygen manifolds, and the sealed troop-column doors while trying to explain that he had never used a jet pack, had not been issued a rifle, and still needed to meet Company Z somewhere on the moon.

“Sounds like you're ready,” Rbra said.

At the aft deployment hatch she pulled a spare personnel maneuver unit from an emergency rack and locked it onto the shoulder mounts of Bo's mismatched suit. One clamp attached to the orange torso. The other attached partly to the gray arm and was reinforced with duct tape. The pack's control system examined the four incompatible suit generations, gave up identifying them, and selected MANUAL CHILD MODE.

Rbra placed the control grips in Bo's hands. “Squeeze to go. Point away from whatever you don't want to hit.”

“What if I don't want to hit anything?”

“Good luck.”

She opened the back hatch.

Black sky, blue haze, missile trails, falling wreckage, and the whole advancing surface of Callisto appeared beyond it.

Bo tightened his grip on the jet-pack controls.

Rbra kicked him out.

CHAPTER FOURTEEN HOT COFFEE

Bo woke up face-first in icy regolith that was equal parts white and black.

The white part was shattered water ice. The black part was pulverized metal-rich rock, sulfur, carbon compounds, soot and whatever remained after military procurement met geology at high velocity. Together they formed a coarse, crunchy surface that had worked its way into every gap around Bo's helmet seal.

He lifted his head slowly. His jet pack was gone. If it had ever worked, it had completed that portion of its service somewhere Bo could not see. Two broken strips of duct tape remained on his shoulder mounts. A shallow trench behind him suggested that he had arrived horizontally, bounced twice and plowed face-first through thirty feet of Callisto before stopping against a patch of harder ice.

Bo remembered Rbra saying good luck. He remembered the hatch opening. He remembered her boot.

After that, nothing.

The battle raged around him. Laser fire crossed the crater floor in brilliant straight lines, visible where dust, vapor and temporary atmosphere scattered a fraction of the beam. Artillery rose in slow arcs under Callisto's weak gravity. Missiles left crooked white trails overhead. Somewhere beyond a ridge, repeated detonations lifted curtains of black regolith that hung for long seconds before falling.

At the top of a tall ice spire several miles away, a weapon unfolded. Its emitter was hidden among fortifications carved into the ice. Long glowing tendrils rose from it in volleys: streams of liquid tungsten magnetically pinched into narrow ropes, heated beyond incandescence, and thrown into the sky. In vacuum the ropes separated into chains of molten droplets. Each droplet cooled from white to yellow to red while climbing, then spread across the flight paths of descending ships as a moving minefield of dense metal.

A drop ship crossed one of the volleys. Its nose vanished in a spray of sparks. The rest continued downward with admirable moral resistance.

Bo watched soldiers fly overhead on jet packs. Some banked toward the battle and fired their rifles before landing. Others ran out of propellant. Their packs coughed, flashed reserve warnings and became expensive backpacks. The soldiers fell. Those who survived struck the regolith,

rolled, tore the dead packs from their shoulder mounts, grabbed their rifles and ran forward shooting.

The sky above them was not black in every direction. Close to the horizon, carbon dioxide vapor, dust and exhaust made a thin blue haze. Above it, space remained hard and dark.

Several carrier ships drifted across that darkness. They orbited only dozens kilometers overhead, yet from the surface they appeared surprisingly small: bright moving points with the occasional glint from a rotating ring. Their true lengths were lost against the distance. Only their motion distinguished them from stars and only their falling drop ships distinguished them from responsible stars.

Halfway up the sky hung Jupiter.

Bo froze.

From the Jupiter-facing side of Callisto, the planet remained nearly fixed in the sky because the moon always kept the same face toward it. At Bo's approximate longitude, with the local four-day morning well advanced but not yet noon, the Sun stood roughly forty-five degrees from the direction of Jupiter. That geometry showed Bo a broad gibbous planet, about eighty-five percent illuminated. A dark terminator curved down one limb while the sunward belts shone cream, rust, and pale brown.

Jupiter's apparent diameter was about 4.35 degrees. Earth's Moon, viewed from Earth, would have fitted across it nearly nine times (that is if Bo knew what Earth’s moon was, or Earth for that matter). His gas giant home planet covered roughly fifteen square degrees of Bo's sky; not enough to fill the heavens, but far too much sky for something that looked capable of judgment.

The Great Red Spot faced Callisto. To Bo it was not a storm larger than Earth. It was an eye.

He flopped backward onto his butt. He had seen Jupiter from Io all his life, swollen and striped above industrial horizons, but never from this distance and this angle. Here the planet looked rounder, colder and more complete. Its gibbous face leaned over the battlefield with one enormous red eye fixed on the moon, as if checking whether the war had accomplished anything since breakfast.

“That's menacing,” Bo whispered.

A missile crossed in front of Jupiter and exploded.

Bo decided he liked the soldiers' idea better. Fly in, ditch the jet pack,

grab a rifle and run into battle. It was simple. It had direction. It involved shouting.

He reached for his rifle but his hand closed around something else. It was a long metal wand with a trigger grip and a wide spray nozzle. Bo remembered using something similar to paint Granny's barn on Io, except Granny's sprayer had not been pressure-rated and had stopped working whenever it detected paint.

A reinforced hose ran from the wand to a cylindrical canister on Bo's back. The canister occupied the shoulder mounts where his jet pack should have been.

A recorded voice spoke inside his helmet. “COFFEE SUPPLY: THREE GALLONS.”

Bo turned his head. “Granny?”

The voice did sound like an old woman. Not exactly Granny, but close enough to make him sit straighter.

“DO NOT ATTEMPT TO CONVERSE WITH THIS RECORDING. I AM A PRERECORDED VOICE AND PART OF YOUR SPACE-SUIT LOGISTICS PACKAGE. TRY TO PAY ATTENTION.”

Bo looked down at the wand. A yellow warning beside the trigger read WARNING: HOT COFFEE. Another label read PROPERTY OF THE 1701ST LOGISTICS BATTALION, COMPANY F. A smaller plate beneath it listed beverage strength, caffeine concentration, maximum delivery pressure and the disciplinary consequences of adding cream to an unsanctioned reserve reservoir.

So that was the difference between infantry and logistics. Coffee. Bo wanted to smack himself in the forehead but his visor prevented that action.

Bo remembered the hand truck, the cargo drop ship, and the single column of troops aboard it. He had assumed they were engineers. They were Company F logistics soldiers, deployed to deliver the most important fluid in the Jupiterian military after hydraulic oil.

Well, if hot coffee was good enough for Granny to drink, it was good enough for the infantry. Bo jumped to his feet with renewed enthusiasm and a clear mission. Hydrate and stimulate the troops.

He ran into battle.

Extreme short-range combat communication was handled helmet to

helmet by a UHF sideband radio. Each suit carried a milliwatt transmitter and a tiny antenna on top of the helmet. The power was deliberately feeble. In open terrain the useful range was about fifteen feet, less among metal wreckage or soldiers with unusually thick skulls.

The channel remained open automatically whenever two military suits entered range. No buttons, call signs or frequency selections were required. The radios exchanged suit codes, opened their squelch and let the soldiers speak as if air existed between them. Beyond fifteen feet, the voices vanished. This kept squad conversations local, prevented the entire battlefield from sharing one argument and allowed a soldier to escape criticism by taking three large steps backward.

Bo passed flying troops, running troops, crawling troops and troops on motorcycles. The motorcycles bounced over the crunchy regolith with rifles mounted above their handlebars. Soldiers fired laser weapons in every direction. Enemy beams came back from trenches, crater rims, wrecked vehicles, ice fissures and locations that appeared empty until someone died near them.

None of that was Bo's problem anymore. Coffee was.

He found a ground soldier leaning on his rifle beside a crater. The soldier's chest heaved inside his suit. His cooling system had painted a red exhaustion bar across his visor.

Bo entered radio range. “Would you like some hot coffee?”

The soldier looked at the coffee wand, looked at Bo's multicolored suit and looked at the laser fire passing over both of them. “Get lost.”

Bo stepped backward. At sixteen feet the soldier's radio cut off in the middle of a second opinion.

He tried another soldier who was loading ammunition behind a wrecked motorcycle. “Hot coffee?”

“No.”

A pair of assault troops ran past.

“Coffee?”

“Cover fire!” one shouted.

“I don't have that flavor.”

They left radio range.

Bo continued across the crater floor, offering coffee to anyone whose

helmet antenna came within fifteen feet. Most ignored him. Several told him to leave. One asked for tea, then was struck by a laser before Bo could explain the supply situation.

Near a shattered ice berm he found a dying soldier.

The man lay on his back with several black laser holes burned through his chest armor. Vapor escaped from one. Emergency sealant had closed the others but could not replace the organs underneath. His rifle lay beyond reach. His suit displayed a calm blue message advising him to remain still until medical assistance arrived in three to five days.

Bo knelt beside him.

The radios connected.

“Please,” the soldier gasped. “Put me out of my misery.”

“Would you like some hot coffee?”

“What? No.”

“It might make you feel better.”

“It won't.”

“Granny always had coffee when she felt bad.”

“Please just shoot me.”

“I don't have a rifle.”

The soldier stared at him before he looked away blankly into the distance.

Bo found the beverage feed port on the side of the soldier's helmet. It was marked SERVICE BEVERAGE - VERIFY TEMPERATURE. He connected the coffee nozzle, twisted it until the gasket locked and squeezed the trigger.

Three ounces of coffee at eighty-eight degrees Celsius rushed through the port. The soldier's internal drinking tube was not connected. Scalding hot coffee sprayed across his face.

His eyes opened wide. “OH GOD!”

Bo released the trigger. “Oh crap! I'm so sorry.”

The soldier screamed. The sound filled Bo's helmet at full UHF volume.

Another troop ran past, entered range, and heard the screaming. Without slowing, he reached down, fired his service revolver once into

the dying soldier's helmet and continued into battle.

Bo fell backwards with the nozzle still connected. The smell of burnt flesh drifted into his helmet somehow. He bent forward and vomited into his helmet.

Automatic suction activated around the neck ring. A narrow gutter pulled the material from his face, separated liquid from solids, filtered anything the suit considered reusable and whisked the remainder into a waste cartridge mounted beside the coffee reservoir.

"DIGESTIVE EVENT COMPLETE," said the old woman's voice. "FIVE MINUTES OF OXYGEN REMAIN. ADD MORE ICE."

Bo sat there a long moment not understanding what had just happened. He slowly removed the nozzle from the soldier's helmet port.

"What the…?" Bo began.

"DO NOT ATTEMPT TO CONVERSE WITH THIS RECORDING."

The suit carried no large oxygen tank. Logistics troops replenished oxygen by feeding clean water ice into a small electrolyzer on the hip. Electrical power split the water into oxygen for breathing and hydrogen for dumping, fuel cells or emergency beverage heating. The process was slow and inefficient, but ice covered much of Callisto and compressed gas cylinders attracted laser fire.

Bo picked up a white chunk from the ground and pushed it into the ice hopper.

The suit ground it loudly. "CONTAMINATION: FOURTEEN PERCENT SILICATE, NINE PERCENT METAL, TRACE SOLDIER. ACCEPTABLE."

His oxygen estimate climbed to eleven minutes.

Bo stood. The dead soldier had stopped oozing fluids onto the ground since without an intact visor everything inside had frozen solid. Bo saluted him, retrieved the coffee wand and continued his mission with less enthusiasm but no improved judgment.

After several more refusals, Bo changed tactics. He had noticed that soldiers rejected coffee when coffee was the first thing he mentioned. Perhaps they wanted to be treated like people rather than beverage ports. Granny often talked to visitors before feeding them. Sometimes she talked until they left, but the principle remained sound.

Bo approached a rifleman firing from behind a low ridge.

Their radios connected. “Hey man, what Saturnian unit are you fighting today?” Bo asked.

The rifleman fired twice. “No idea. I have yet to see one. I’ll let you know their regiment number when I see it.”

“Oh okay.” Bo suddenly realized he didn’t really care to know that information so asked a different question. “How do you know which way to shoot?”

“If you see fire coming your way, you shoot back.”

A beam struck the ridge between them.

The rifleman returned fire.

“That’s so fascinating. Would you like some coffee?”

“No.”

Bo tried a motorcycle soldier whose front wheel had sunk into soft regolith. “How has your experience with wrestling informed your day-to-day operations as a soldier on the front line?”

“What?”

“Do you like savory or fruit pies?”

“Go away.”

Bo stepped back and the radio disconnected.

He found two soldiers loading a mortar with hand-sized tactical nukes behind an ice block.

“Do you know where Rbra is?”

“Who?”

“She's tall. And very pretty.”

They looked around a battlefield containing thousands of six-foot soldier-class bodies.

“Very tall,” Bo added.

One of them accepted coffee just to end the conversation. Bo checked the drinking tube, lowered the delivery temperature and dispensed six ounces at the regulation rate. The soldier swallowed, blinked and returned to the weapon with visibly improved hostility.

It had worked.

Bo found another taker in a communications trench. This soldier listened to Bo describe three wrestling holds and accepted coffee during the fourth. Bo delivered it without scalding him.

In twenty minutes, Bo learned almost nothing about the battle. No one knew the Saturnian unit opposite them. No one knew the larger objective. Few knew which quadrant they were in. One soldier claimed the battle line had moved seventy-five feet forward. Another said it had moved forty feet backward. Both agreed the coffee was too strong, which meant it was perfect.

Bo had successfully hydrated and stimulated at least two soldiers.

“COFFEE SUPPLY: TWO POINT SIX GALLONS,” the old woman reported. “OXYGEN: SEVEN MINUTES. RECOVERY DIRECTIVE: REMOVE SPARE OXYGEN CYLINDERS FROM DECEASED PERSONNEL AS ENCOUNTERED.”

Bo looked across the crater floor. There were spare cylinders everywhere.

“That seems rude,” he said.

“DO NOT ATTEMPT TO CONVERSE WITH THIS RECORDING. TRY TO PAY ATTENTION.”

CHAPTER FIFTEEN SMUGGLING NEAR A TURTLE

Meanwhile, over a nearby crater rim and out of the direct line of sight of the tungsten-dispensing ice spire, a giant TURTLE was entering the final phase of redeployment.

No one knew what TURTLE stood for.

The vehicle's original procurement file had been revised forty-three times, partially burned, translated into French, translated back by a linguist that disliked acronyms and finally classified to conceal the embarrassment. Troops generally assumed the name described its shape, speed, temperament and likelihood of surviving something that killed everybody around it.

The TURTLE was a tracked ground vehicle powered by a full-sized fission reactor. It stood approximately fifty feet tall and measured more than one hundred feet across. Its armored body resembled the upper third of a giant sphere that had been sliced off, lowered onto sixteen independent track assemblies and declared militarily operational before anyone could ask how it turned.

It didn’t turn.

Eight paired track units surrounded the hull. Each pair could drive at a different speed, reverse independently, rise or fall on hydraulic legs and rotate several degrees around its mounting. Theoretically, to steer left, the right-side tracks moved forward while the left-side tracks slowed, reversed or reconsidered. But this never worked in practice. On hard ice the entire machine skidded enough to be declared a turn. On loose regolith it plowed a new crater. On mixed ground it selected both methods giving the maintenance crew time to move ahead and ask for a new medic team.

The fission plant sat low in the center beneath layers of water, tungsten, boron plastic, spare toilet paper and soldiers. Its thermal output powered electric track motors, life support, weapons, kitchens, pumps, workshops and a heating system capable of making one compartment unbearably hot while the next froze. The reactor could operate for years. The tracks required attention every forty minutes.

The hull carried eight missile tubes on each side. Their armored doors formed two rows along the curved flanks. Two laser batteries occupied the fore sector and two more the aft, each mounted in a shallow rotating cup that could rise above the armor, fire and withdraw before the enemy

returned the favor. Smaller defensive emitters ringed the roof-line for missiles, aircraft, jet-pack infantry and clerks attempting to collect signatures.

Inside, a TURTLE could carry one thousand soldiers and their support vehicles. The lower vehicle deck held crawlers, motorcycles, motorcycles with sidecars, motorcycles without riders, field guns, repair tractors and long trains of unpowered cargo sleds. Troop compartments filled the middle decks. The bridge, communications spaces and weapons control occupied the armored crown.

Near the bridge was a small hangar containing a hopper.

A hopper was a short-range spacecraft capable of carrying twelve people into orbit or sending them anywhere on Callisto along a ballistic trajectory. It rose on a cluster of solid cartridges, coasted above the horizon and descended on throttled hypergolic landing rockets. A hopper could cross half the moon faster than a radio message passed through headquarters, though the passengers arrived with less confidence and often in a different order.

The TURTLE carried one for reconnaissance, emergency evacuation, senior-officer escape, and other functions listed in precisely that sequence for enlisted review.

This particular machine bore the designation TURTLE-88 and the painted name PERSONAL HYGIENE. Its armor was a patchwork of gray, white, and rust-red replacement plates. Frozen mud packed its tracks. A broad loading ramp descended from an opening in its side and suited workers moved pallets through it while the reactor idled beneath them with the low vibration of contained rage.

Captain Phompson stood on the ice personally supervising the operation.

He was short even for a native Jupiterian, two feet three inches tall and almost three and a half feet wide. His pressure suit had been built accordingly. It resembled a white armored barrel with gloves. The helmet was wider than it was high, and a raised command stripe ran across the top so vehicle crews would not mistake him for cargo.

Phompson did not use a wheelie. He paced in front of the loading ramp on short, powerful legs, turning every few steps because his body required more room to reverse than to advance. His secretary was not present to file her nails, chew gum or warn him when his decisions became annoying.

A crawler came over the crater rim. It appeared slowly, front plow first, dragging a cloud of black-and-white regolith behind it. The vehicle resembled a half-track designed by people who mistrusted wheels. An open cab occupied the front. A semi-enclosed cargo bed sat behind it beneath a low armored canopy. Wide tracks supported the rear half. Two broad steering skids replaced the front wheels and scraped across the ice like blunt skis.

Under the hood was a small fission reactor.

The crawler had no electronics. No digital controls, guidance system, engine computer, navigation display, automated transmission or intelligent component could disable it by default. Steering rods ran directly from the driver's arms to the front skids. Valves were opened by pedals, cables and levers. Speed was shown by a needle connected to a spinning wire. Direction was determined by looking where the vehicle went and wildly spinning the steering wheel in the opposite direction.

The reactor did not drive the tracks electrically. It heated ice.

A plow at the front gathered surface ice and regolith into a hopper. Filters removed most of the rocks and a few bones. Reactor heat converted the meltwater into high-pressure steam. The steam drove opposed pistons. Crankshafts turned reduction gears. Reduction gears turned the tracks. Exhaust condensed across radiators, froze and returned to the water tank if the atmosphere, vehicle angle and maintenance schedule were all feeling cooperative.

The system had extraordinary torque. A crawler could pull loaded sleds, disabled vehicles, sections of trench wall or another crawler whose crew had forgotten to gather ice. Its acceleration was terrible. From a standing start it required several seconds to become visibly committed and nearly a minute to achieve a speed that worried pedestrians.

The crawler drew alongside TURTLE-88 with a final sigh of steam.

Serj drove. Moe sat beside him wearing his sunglasses beneath his helmet visor. Rbra stood in the cargo bed with one hand on the canopy frame and the other resting near her sidearm. All three wore pressure suits.

Serj shut the steam valve. The pistons slowed through a sequence of heavy clanks. The crawler stopped six feet beyond where he intended, which counted as precision driving. “This shouldn’t take long,” he informed his underlings before climbing down onto the ice.

Captain Phompson walked out to meet him.

Their helmet radios connected at fifteen feet.

“Captain?” Serj said. “I didn't expect to see you on the ground.”

“Neither did I.” Phompson looked back at the TURTLE as if it had personally insulted his family line. “My lieutenant is unavailable.”

“Forward assignment?”

“He disappeared from the carrier with our secretary.”

Serj waited.

“I am choosing to believe they eloped,” Phompson continued. “Anything else means treason and treason requires paperwork.”

“And firing squads.”

“Yes, and that.”

“Then congratulations to them.”

Phompson smiled nervously.

Behind the captain, workers loaded pallets marked SOAP, RAZORS, TOOTH POWDER, ANTIFUNGAL FOOT INSERTS and STANDARD ENLISTED FRAGRANCE. One pallet carried several thousand rolls of military toilet tissue, each square printed with an encouraging statistic.

Phompson motioned toward the vehicle. He began talking like Serj had asked him a question. “This TURTLE was supposed to be a mobile field hospital. It was assigned to treat soldiers not wounded badly enough to be recycled.”

Everyone on Callisto knew recycled had become a euphemism for abandoned. The distinction had developed because official medical doctrine required casualties to be sorted into three categories: return to duty, repairable and recyclable. The third category originally meant biological recovery aboard the carrier. On the surface it meant someone took the casualty's oxygen tank, marked the location if convenient and hoped future logistics would become interested.

“We prepared six surgical wards,” Phompson said. “Two regrowth rooms. Eight hundred recovery racks. We even brought anesthetic.”

“What kind of patients did you end up with?”

“Not the appropriate kind. They either walked in under their own power or arrived below our treatment threshold. Sometimes both.”

A laser battery on the TURTLE roof rotated toward a distant flash. It

tracked for a moment, decided the threat belonged to someone else and lowered again.

“So,” Phompson continued, “we are now a commissary.”

“So I’ve heard.”

“The battlefield was out of soap. Morale had collapsed twelve percent below the collapse caused by enemy action. Tooth powder remains critical. Razors are being traded at ammunition rates. Three companies refused to advance until supplied with foot inserts.”

“Reasonable.”

“Completely. Filthy soldiers become revolutionary.”

The explanation ended. Business began.

Serj returned to the crawler and lifted the sealed box from the cargo bed. He placed it on the ice between them and released the latches. Inside were Titanian cigars.

They lay in fitted rows beneath sheets of humidity film: long, dark, hand-rolled cylinders with gold bands and individual serial numbers. Some were the same expensive kind Serj had smoked during descent. Others came from estates on Titan whose names had outlived the estates, their owners and several changes of government.

Captain Phompson crouched over the box. His suit made a soft hydraulic grunt. He inspected a wrapper, pressed one cigar gently between his fingers and read its band through his visor. “Seems authentic.”

“As authentic as anything from Titan.”

“But different than last time.” Phompson looked up at Serj.

Serj smiled. “Moe sat on the humidity control all the way from Himalia. Shit happens.”

Moe raised one hand from the crawler as if to say, “My bad.”

Phompson nodded, satisfied. He motioned to a member of his staff.

The staff soldier disappeared up the TURTLE ramp. A moment later an electric pallet tug descended carrying three plain crates. Their markings had been painted over. Their corners were reinforced. Each was small enough for one soldier to carry in Callisto gravity and heavy enough to discourage questions on Jupiter.

Rbra climbed down from the crawler and crossed to the crates. She

opened the first crate and looked inside. Her expression did not change. She opened the second, moved one item with a gloved finger and closed it again. She opened the third. Whatever it contained reflected briefly in her visor.

Rbra gave Serj a thumbs-up.

Serj closed the cigar box. Captain Phompson took possession of it. They shook hands across the exchange, one white armored barrel and one full-sized sergeant conducting a private treaty beside a vehicle carrying a month's worth of toilet paper.

"Pleasure doing business," Phompson said.

"For Jupiter."

"Of course."

They went their separate ways.

Phompson walked back toward TURTLE-88 with the cigars tucked beneath one arm. Serj took the first crate. Moe took the second. Rbra took the third. They carried them to the crawler and threw them into the semi-enclosed cargo bed with less ceremony than the inspection suggested.

Moe returned to the passenger position. Serj opened the steam valve and waited for pressure to rise. "Pick up the pace," he said to Rbra. "I don't like being in the open this long."

Rbra climbed in after them and secured the straps then gave a thumbs up.

The crawler's pistons began to move: one clank, then another, then a slow mechanical pounding. The tracks bit into the regolith. The front skids turned toward the crater rim.

In the distance, another tactical nuclear weapon detonated.

White light climbed over the horizon. The ground rose beneath them like a wave. TURTLE-88 settled on its sixteen tracks while ice fractured outward from each pad. The crawler bounced, lost traction, found it again, and continued accelerating at a pace that remained mostly theoretical.

Behind them, Captain Phompson did not look back. He had cigars, toiletries, a missing lieutenant and a war on hygiene to administer.

CHAPTER SIXTEEN CHECKPOINT

They took off down what could generously be called a trail cut through the ice and regolith.

The crawler's front skids followed two shallow grooves left by heavier vehicles. Its tracks ground the center ridge into black-and-white powder. Every few yards the trail crossed an impact crack, a frozen exhaust trench or the remains of a sign explaining that the route had failed inspection.

Serj drove with both hands on the steering levers. Moe sat beside him, sunglasses reflecting the pale ground. Rbra rode in the semi-enclosed cargo bed with the three plain crates strapped behind her. The crawler's little reactor boiled ice beneath the hood, and the steam pistons beat out a slow metallic rhythm.

They came over a rise and were greeted with the sight of a waiting checkpoint below. All three looked at it. Then they looked at one another. It had not been there an hour earlier.

Someone had planted armored barriers across the trail and reinforced them with blocks of excavated ice. Portable floodlights faced both directions. A squat hut stood behind the barrier. Antennas rose from it. Trenches spread along the crater rim, filled with experienced soldiers whose weapons were already pointed at the crawler. Behind it all was a MP hopper waiting on a makeshift landing pad.

Serj took a deep breath. He left the steam valve open and continued ahead.

The crawler accelerated toward the checkpoint at its maximum rate, which gave everyone there sufficient time to aim, reconsider, aim again and discuss where to place the warning shot. Serj closed the valve fifty yards out. The pistons slowed. The crawler rolled another twenty yards and stopped with its plow touching the painted line.

An entire bored platoon was waiting for them.

These were not newly hatched soldiers. Their suits were scratched, patched, and fitted to bodies that had learned to move inside them. Ablative armor plates had been replaced in mismatched patterns. Rifle stocks carried notches, unit marks, and private warnings. The soldiers spread themselves instead of bunching together, used the ice blocks as cover and kept one another out of their lines of fire. Experience was

visible mainly in the number of things they did not do.

A full sized vat soldier with the stripes of a third lieutenant approached the crawler. He wore a pressure suit with military-police bands around both arms. His helmet visor was clear. A narrow mustache had been drawn across the outside in grease pencil because the seal prevented him from growing one where people could appreciate it.

The helmet radios connected. “Papers,” he said.

Serj looked at Moe.

Moe opened the glove compartment.

The crawler had no electronics, but it did have a glove compartment. Inside were two gloves, three cigarette butts, a steam-valve wrench, a map of Ganymede, a ration straw and several folded documents held together with a frozen rubber band.

Moe selected the documents and handed them down.

The lieutenant opened the first sheet causing the frozen rubber band to crumble to dust in the process. The sheet authorized the movement of one crawler carrying sanitation equipment from a location that no longer existed to a unit that had been destroyed six months earlier. The signature belonged to Lieutenant Colonel Rchibald Aglund, although his surname was spelled differently on all three pages. The official seal was a circular coffee stain containing half of the colonel’s initials.

The lieutenant examined the second sheet. It was a laundry receipt. He looked at Moe.

Moe looked back through his sunglasses.

“These are obviously fake,” the lieutenant said.

Serj glanced at the lieutenants stripes and wondered something similar.

“They were in the official compartment,” Moe replied, responding to the lieutenant.

The lieutenant took step back. “I'll have to ask all of you to exit the crawler.”

Rbra's hand moved toward the handgun at her thigh.

Serj caught her eye and shook his head.

The platoon shifted around them. Rifles settled more firmly against armored shoulders. A laser designator painted a red dot across the

crawler's hood, then another on Rbra's chest, then a third on Moe’s sunglasses.

“Wait here,” Serj said. He climbed down.

The third lieutenant led him toward the checkpoint hut. It was a geodesic dome three meters in diameter, assembled from triangular armor panels and anchored to the ice with six long screws. The shape was designed to distribute blast pressure, resist enemy fire and make the life of a bureaucrat stationed inside, a living hell. A leaky air curtain made of flexible magnetic strips covered the entrance. Both men pushed through it into the pressurized interior.

There was room for one desk, two folding chairs, a heater and a filing cabinet designed for flat walls. Serj and the lieutenant remained in their suits with helmets sealed. The hut atmosphere existed mainly to keep the paperwork from freezing.

“Yes,” Serj said, “the papers are forged.”

The lieutenant folded his arms.

“But they were forged on the orders of Lieutenant Colonel Aglund.”

The lieutenant's expression changed by less than an inch.

Serj leaned closer. Their helmet antennas nearly touched. “Its a code. Special cargo, if you know what I mean. For the colonel personally. Eyes only. And he needs it ASAP, if you don’t know what I mean.”

The third lieutenant stopped and thought. This had happened before. Serj’s guess as to what was going on in the lieutenant’s head was pretty close to the mark. Not with this crawler, these soldiers, or these particular forged papers, but the structure was familiar.

Senior officers frequently moved special cargo under documents too false to be official and too official to question safely. The phrase for the colonel's eyes only could mean intelligence material, personal supplies, evidence, banned entertainment, medicine, cigars or a person who needed to arrive without having traveled.

The lieutenant sat behind his desk and steepled his hands. “I am under strict orders to inspect every vehicle for contraband.”

“Of course.”

“Every vehicle.”

“Naturally.”

“No exceptions.”

Serj waited.

The lieutenant patted the contraband ledger on his desk with one glove. “I'll tell you what I can do. I'll give you thirty minutes to take that crawler back wherever it came from, make whatever rearrangements are necessary and return here so I can inspect it without finding anything.”

Serj nodded. “That would be… helpful.”

“But it will cost you.”

“I don't carry cash.”

“Then use your credit chit.”

“None of my people carry those either.”

The lieutenant frowned.

“For obvious reasons,” Serj added.

The lieutenant's mustache moved as his jaw tightened beneath the visor.

Outside, Moe and Rbra stood beside the crawler with the military police pointing rifles at them.

A hopper waited near the checkpoint. It rested on four landing legs beyond the trench line, a blunt twelve-seat craft with its solid boost cartridges still attached beneath the fuselage. Military-police colors spiraled around its hull. Blue and red beacon lamps flashed along its spine. In vacuum the siren made no sound outside, so the hopper broadcast the siren directly into nearby helmet radios, ensuring that everyone could be annoyed by authority even where nature had forbidden noise.

The hopper was ready to take prisoners back to the carrier brig. Its cabin was narrow, its restraints were numerous and its ascent cartridges had been selected for speed rather than spinal continuity.

One MP looked at the empty mounts on Moe's and Rbra's suits. “What happened to your jet packs?” he asked.

Moe and Rbra looked at each other and laughed.

The MP did not.

“Try not to get blown out of the sky on your way back to the carrier,” Rbra said, nodding toward the hopper.

Moe looked at the hopper's bright paint and exposed cartridges. “They'll see you from three quadrants with those.”

“They're recognition colors.”

“Yes,” Moe said. “The enemy will recognize them.”

The MP adjusted his rifle.

Rbra snarled behind her visor.

A moment later Serj emerged from the dome with the crawler keys in his hand. He did not appear with the third lieutenant, who remained inside reconsidering the relationship between extortion and liquidity. Serj walked toward the crawler and made a circular wrap-it-up motion with one glove over his helmet.

Confused MP’s backed up, hearing the order in their helmets to let the crawler leave the same way it came.

Moe climbed into the passenger side.

Rbra backed toward the cargo bed without turning away from the MPs. She climbed aboard and checked the straps over the three crates.

Serj entered the cab, inserted the physical key into the steam-control lock and opened the reactor valve.

The crawler did not start immediately. It warmed, hissed, built pressure, moved one piston and appeared to consider whether arrest might be easier.

As the MPs watched, the third lieutenant came to the dome entrance.

The hopper's silent siren continued flashing and broadcasting authority.

At last the pistons began their heavy clanking. Serj hauled both steering levers back. The rear tracks reversed. The front skids scraped across the ice. The crawler turned in a slow, broad arc that exposed every side of the cargo bed to inspection except the interior.

They headed back the way they had come. No one spoke until the checkpoint disappeared behind the rise.

Then Moe said, “Those papers were terrible. I like Ary, but we need a new forger.”

Serj kept his eyes on the trail. “They got us thirty minutes. What we need is to catch a break.”

Behind them, the lieutenant began the paperwork documenting that he

had never seen them.

CHAPTER SEVENTEEN REASSIGNMENT TO TURTLE-88

Bo found the TURTLE by following the tracks.

This was easier than following orders. The tracks were each wider than a kitchen table and had crushed a pair of black roads through the white ice, then crushed the black roads into white again. They led over the low ground behind the crater rim, where the giant vehicle crouched out of sight of the tungsten spire and distributed toilet paper too tired to give a crap.

Bo walked toward it with the coffee wand held before him like a ceremonial staff. Every time another helmet came within fifteen feet, the short-range radio opened automatically and he made his offer. “Coffee?”

“No.”

“What if it’s hot?”

“Still no.”

“It has stimulants.”

“So do the explosions.”

He offered coffee to riflemen, motorcycle riders, stretcher bearers without stretchers, and one man sitting behind a boulder writing a will on the back of a requisition denial. Most told him to go away. A few used shorter instructions. Bo kept moving. The canister on his back sloshed less and less, though he took the silence to mean the coffee had become creamer.

At last a lance corporal waved him over. The corporal had been awake for thirty-one hours and had developed the bright, steady gaze of a man who could see through time but no longer understood chairs.

“You really got coffee in there?”

“Three gallons,” Bo said proudly.

The old woman in his helmet corrected him. “COFFEE SUPPLY: POINT ZERO FOUR GALLONS.”

“Nearly three gallons.”

The lance corporal connected his helmet feed port to Bo’s nozzle. Bo squeezed the trigger. There was a healthy hiss, two and a half sips, and then a noise like an elderly plumbing fixture reconsidering its retirement

plans. Brown foam trembled at the nozzle and withdrew.

“COFFEE SUPPLY EXHAUSTED,” said the suit.

The lance corporal swallowed the last mouthful with his eyes closed. “Best thing I ever tasted.”

Bo checked his lines. “There’s a lot more where that came from. Uh, just not in my tank.”

The lance corporal looked over Bo’s mismatched suit, the empty logistics canister, the missing armor plates, and the warning label on the wand. “You sure you belong to the commissary TURTLE?”

“I belong to Company Z. Or maybe Company F. I was in Company Z first, but Company F gave me the coffee.”

“Huh?”

“Well, I thought it was a rifle. Say, what’s a TURTLE?”

The lance corporal decided that two and a half sips created a moral obligation, although not a large one. He took Bo by the elbow and guided him toward the lowering ramp of TURTLE-88.

The vehicle rose fifty feet above them, a third of a metal sphere sitting on sixteen track assemblies. Its armor was gray where it had been painted, white where frost had collected and black where Callisto had thrown itself against the hull. Above the ramp, somebody had stenciled PERSONAL HYGIENE in letters tall enough to be read from orbit.

Captain Phompson stood at the foot of the ramp directing three pallets of soap, four crates of socks, and a crawler full of toilet paper into their proper tactical formations. His pressure suit made his two-foot-three-inch body look like a wide steel barrel with a faceplate.

He turned when the lance corporal saluted. Then he saw Bo. “What are you doing dispensing coffee, sub-private? You’re not authorized for that mission.”

“Well, Captain, first I missed Company Z because Jak’s head was in my helmet, and then I got on Serj’s drop ship because Rbra was there, except I told her Serj sent me, which wasn’t true, and then Bliv thought the controls were alive, so Moe gave me tape and after Rbra kicked me out…”

“Stop.”

Bo stopped with enough story left in him to supply several courts-

martial.

Phompson rubbed the outside of his faceplate where his forehead would have been. “Report aboard to the master sergeant for reassignment.”

Bo brightened. “Serj is here?”

“The master sergeant.”

“Is he white-skinned and kind of tall and has one kind eye? He told me to stay away from Rbra. I call him Serj because she said “Yes, Sarge,” but I think the he got lost in the radio…”

Phompson narrowed his eyes until Bo could see only two suspicious slits through the glass. “Report aboard to the master sergeant for reassignment.”

Bo was thinking of another way to describe Serj.

“Don’t make me give the order a second time.”

“What?”

The lance corporal pushed him up the ramp.

Inside, the TURTLE was less a vehicle than a town that had been surprised during construction and ordered to advance. A two-lane vehicle deck ran through its middle. Crawlers idled beside unpowered sleds. Motorcycles hung from hooks overhead. Racks of missiles occupied armored bays along the curved outer wall, because no military architect had ever seen anything wrong with storing high explosives beside bulk shampoo.

Bo wandered past troop compartments packed with folding bunks, a surgical ward now stacked floor to ceiling with toothpaste, and a machine shop manufacturing replacement buckles for equipment that had never needed buckles. Pipes from the fission plant throbbed under the deck. The reactor’s heat boiled melted Callisto ice, and the steam drove turbines, warmed the cabins, purified drinking water and made every lavatory smell faintly of a public swimming pool.

No one stopped Bo. Everyone assumed that a soldier carrying an empty coffee apparatus was either performing an important duty or had already been punished for failing to perform it.

He asked seven sergeants if they were the master sergeant. Two ignored him. Three said no. One threatened to strike him with a mop. The seventh occupied a cage office overlooking the aft track well and wore enough chevrons to suggest that several lesser sergeants had been sewn

together.

Bo saluted. “Serj?”

“Master Sergeant Venn.”

Bo’s shoulders sagged. “Oh.”

Venn inspected him from the boots upward. Different-colored legs. Different-length arms. Empty coffee tank. No rifle. Missing armor. A patch identifying a logistics battalion to which he did not belong. Venn had spent twenty-eight years converting mysteries into work assignments. “You want reassignment?”

“Captain Phompson wants it.”

“External hull sanitation.”

Venn issued him a bucket with a pressure lid, a stiff vacuum brush, a scraper, a bottle of electrostatic solvent and a safety line whose warning tag read NOT FOR PERSONNEL. He pointed to an auxiliary lock. “Go scrub the port quarter. Black grit interferes with the ablative coating.”

“Which quarter is port?”

“The dirty one.”

Outside again, Bo discovered that all quarters were port. And all were filthy.

He chose a patch beside the aft missile doors and began scrubbing. In Callisto’s weak gravity he could lean almost horizontally against the brush and move in long, heroic strokes. The solvent charged the dust. The dust leaped onto the bristles. The bristles discharged it onto Bo. After ten minutes the TURTLE was slightly cleaner and Bo was indistinguishable from the leading hemisphere.

He was working beneath the final E in HYGIENE when the ramp behind him rose. Bo turned. “Hey.”

The ramp sealed. Locking dogs hammered into place. Warning lamps began to revolve along the hull, but there was no air outside to carry a siren. The sixteen track assemblies took up their load one after another. The ground shuddered. TURTLE-88 started forward.

“Hey!” Bo shouted over the helmet radio. The transmitter reached fifteen feet. The master sergeant was farther away than that and behind a foot of armor.

Bo ran alongside. Running on Callisto involved a series of slow,

ambitious leaps followed by disappointing negotiations with the ground. He caught a handhold, swung outward, and slapped against the hull. His cleaning bucket struck a track guard. The lid came off. Frozen gray slush blossomed around him in a perfect sphere.

He tried to pull himself up. The brush snagged between two armor plates. The TURTLE pulled the brush. Bo held the brush. His safety line, which was not for personnel, released exactly as its warning tag had promised.

Bo let go. He bounced twice, rolled through his own sphere of dirty ice, and came to rest sitting on his butt with the scraper across his knees.

TURTLE-88 continued toward the crater rim without him. It climbed slowly. Eight pairs of tracks bit into the slope. The huge curved back rose above the protecting ridge, followed by the bridge, the hopper hangar, and the words PERSONAL HYGIENE. For one second the whole vehicle stood outlined against Jupiter's blue-black sky.

That was enough for the weapon on the distant ice spire.

A glowing thread descended from above. It was molten tungsten, thrown high on a ballistic arc and falling at several kilometers per second. In vacuum it made no whistle. In Callisto's gravity it made no hurry. It simply drew a white-orange line through the sky and touched the TURTLE behind the bridge.

The thread passed through armor, decks, pipes, bunks, toothpaste and the main vehicle bay. Metal flashed into vapor along the cut. Ice became steam faster than it could understand the promotion. The TURTLE separated into two enormous halves.

The forward half leaned downhill, hesitated, and fell onto its side. Split compartments opened along the wound. Soldiers poured out with crates, motorcycles, sheets of toilet paper, and clouds of glittering frost. In the weak gravity they came slowly, horribly; an armored body oozing men like blood.

The aft half contained the reactor plant, the missile magazines, and several thousand gallons of hot water under pressure. The reactor did not explode like an atomic bomb. The steam plant ruptured, the propellants cooked off, and a second later the distinction became academic.

A white flash punched the dark. A column of vaporized ice and powdered regolith rose from the wreck, narrowed, and spread beneath Callisto's low temporary haze. It formed a small, neat mushroom cloud, as if the

end of a thousand men had been prepared for a school diagram.

The ground reached Bo a moment later and slapped him onto his back. Fragments whispered through the vacuum. One struck the cleaning bucket. Another buried itself where his helmet had been while he was sitting up.

Bo remained flat for a while, holding the brush across his chest.

The old woman in his helmet said, “EXTERNAL CLEANING ASSIGNMENT INTERRUPTED.”

Bo stared at the two burning halves beyond the ridge. “Well that sucks donkey balls,” he said.

CHAPTER EIGHTEEN THE HUNCH

A laser bullet was designed to replace a gunpowder cartridge without requiring the military to replace anything else.

This was important because the Jupiterian Department of War owned nineteen billion rifles, six hundred billion magazines, and enough cleaning rods to bridge the gap between Io and common sense. A weapon that demanded new equipment would have been rejected as extravagant. A weapon that placed plutonium inside the old equipment was considered economical.

From the outside, a laser bullet resembled an ordinary cartridge. It had a brass case, a rim for the extractor, and a blunt ruby window where a lead slug ought to have been. Inside was a folded chemical lasing medium, a sacrificial mirror, a heat sink scarcely larger than a fingernail, and a tiny plutonium firing head seated beneath the primer cap.

When the rifle hammer fell, the firing pin struck the plutonium head. The impact collapsed a microscopic neutron-reflecting cup around a quantity of plutonium far too small to become a respectable bomb. It nevertheless produced a brief fission-assisted flash, just enough energy to pump the chemical medium. Excited molecules dumped their energy between the rear mirror and the polished ruby end until the ruby emitted a bright red pulse rated at thirty kilowatts.

Thirty kilowatts was power, not total energy, a distinction the advertising department had removed from the box. The useful pulse lasted about a millisecond, delivering roughly thirty joules to a spot smaller than a freckle. It did not blow a man backward. It boiled a narrow channel through armor, flesh, wiring, or whatever else occupied the freckle. Successive cartridges made additional freckles.

The process was violently inefficient. Part of the pump energy heated the case. Part cracked the rear mirror. Part melted the inner liner into a white-hot spray. Gas from the chemical medium expelled that molten debris out of the ruby aperture immediately behind the beam. Thus every shot produced light first and a small quantity of extremely angry metal second. The rifle’s extractor then threw out the empty case exactly as it had thrown out gunpowder brass for a thousand years.

When everything worked, the result was silent in vacuum, straight over battlefield distances, and red enough for soldiers to know precisely who had fired at them.

When it failed, it was called a dud and was issued again.

Serj saw the mushroom cloud while the crawler was still below the crater rim. It rose in the distance like a white thumb pressed against the black sky, with a gray cap spreading beneath Callisto's temporary blue haze. Serj eased the throttle back. The crawler's fission plant continued boiling ice beneath the hood, driving steam into its pistons and making the tracks clank with patient industrial disapproval.

Moe leaned forward between the seats. His sunglasses reflected the cloud. He looked at Serj. All three of them were thinking the same terrible thought.

Serj guided the crawler over the rim. The skids scraped across the crest, and the far side of the crater opened below them.

TURTLE-88 lay in two pieces. The forward half had rolled onto its side and split across three decks. Bodies, motorcycles, toilet paper and frozen plumbing surrounded it in a broad fan. The aft half was a burning bowl of armor around a crater of its own. Pools of tungsten glowed among the wreckage, cooling from white to orange to red so slowly that the colors appeared painted onto the ground.

At the bottom of the slope, some distance from the wreck, Bo Bovastein was sitting crossed legged, trying to start a campfire.

He had arranged splinters of packing crate in a cone, placed scraps of paper beneath them, and surrounded the construction with stones. The stones were ice. The paper was a requisition form. The wood had been treated with vacuum-resistant fire suppressant. Bo was rubbing two pieces together through pressurized gloves because he remembered that this had once worked behind Granny's barn on Io. He did not remember that the dome sheltering Granny's farm also contained oxygen.

The crawler had not completely stopped before Rbra jumped out. She crossed the ground in three long bounds, seized Bo by the shoulders and shook him hard enough to make the little antenna on his helmet wobble.

"What did you do?" she demanded.

Bo looked from her to the campfire. "Not enough rubbing apparently."

"I mean the TURTLE!"

"Oh, that. Uh, I tried to clean it but I don't think they gave me enough detergent."

"Do you know how many men and women were aboard?"

Serj left the crawler idling and walked down after her. Steam feathered from a relief valve and froze behind him. “Leave him be, Rbra,” he said, waving her off. “Can’t you see the pools of tungsten around the wreckage?”

Rbra didn’t want to look.

Serj continued, “The TURTLE moved too soon and got seen. I doubt Bo had anything to do with it.”

Rbra let go. Bo’s boots settled back onto the regolith.

She took Serj by one armored elbow and led him away. At fifteen feet their helmet radios ceased sharing the same open UHF sideband.

Bo noticed it was Serj and beamed with delight. “I thought you died on the TURTLE!” he called. “Thank Scrod! Did you see that blast!”

Neither of them heard him.

Rbra stopped at sixteen feet to be certain. “I say we trade him for passage at the checkpoint. Bo’s unregistered.” She let that sink in a moment then continued, “And that vat lieutenant is the kind that…”

Serj stopped her with a finger. “I’m not doing that.”

“You don’t even know what I was going to say.”

“Yes, I do.” Serj looked back at Bo, who had resumed rubbing the fireproof wood together. “He might be dumb, but he doesn’t deserve that.”

Rbra folded her arms. “Then we still have three crates, forged papers, a checkpoint platoon, and no route through.”

“I’m thinking.”

“Think faster. He gave us thirty minutes.”

Moe sauntered from the crawler with his hands in his pockets. He circled Bo once, examining the filthy suit, the missing armor plates and the shallow hole a fragment had punched into the ice where Bo’s head might reasonably have been.

He bent down to address Bo. “How’d you survive the drop, kid? Let alone what happened to the TURTLE?”

Bo looked up from the wood. “I don’t know. I just woke up on the ground with a coffee dispenser instead of a rifle.”

Moe considered this. “Have you ever played dice?”

“Is it like wrestling?”

“No, not really.”

Moe sat cross-legged on the regolith and produced a pair of bone-white dice. He explained that Bo should roll them and try to produce a larger number. Bo understood this immediately because it required no reading and because larger was one of the few mathematical concepts taught correctly by his education tapes.

Moe rolled eight.

Bo rolled eleven.

Moe rolled nine. Bo rolled twelve. Moe rolled ten. Bo rolled twelve again. Moe changed dice and rolled six. Bo rolled twelve.

They played nineteen times. Bo won nineteen times.

Moe picked up one die and held it against Bo’s sleeve. “You hiding a magnet under there?”

“A what?” Bo asked.

Moe stopped.

Rbra and Serj were still arguing sixteen feet away. Neither saw Moe draw his service laser pistol. He thumbed off the safety, raised the weapon and aimed directly at the center of Bo’s chest.

Bo squinted his eyes.

Moe pulled the trigger. The hammer struck the plutonium head. Nothing happened. The pistol’s mechanism waited a tenth of a second, declared the cartridge a dud, and ejected it. The unfired laser bullet flipped out and landed in the half-built campfire.

Bo stared at the pistol. Then he jumped up and ran.

“Fetch him,” Moe said.

Rbra turned. “What are you doing?”

“Science.”

She grumbled and went after Bo. In Callisto’s weak gravity he made long, frightened leaps, but his different-length suit legs gave every third leap a slight left turn. Rbra calculated the curve, intercepted him and tackled him into the regolith.

Bo rolled onto his back beneath her. “Uh, thanks for tackling me.”

Rbra's face appeared above him through two layers of glass. "Why are you thanking me?"

"Is this like a date?"

She punched him in the gut.

Serj walked up to Moe and took the pistol from his hand. "What's going on?"

Moe retrieved the ejected cartridge. The firing head bore a clean dent. The lasing medium's status strip remained stubbornly black. "I have a hunch."

"About what?"

"I guess we'll find out, soon enough, one way or another." Moe pocketed his dud. Serj kept the pistol.

Rbra brought Bo back by the collar ring and planted him beside the failed campfire.

"There's a better way to find out than that," Serj said.

Moe looked at the pistol in Serj's hand. "Probably. Won't be as quick though."

Bo rubbed the new dent in his chest plate, then looked from one faceplate to another. "Find out what?"

CHAPTER NINETEEN CRAWLER INSPECTION - BO HELPS

Thirty minutes later, the crawler appeared at the checkpoint again. This time Bo was driving.

He sat high in the open cab with both hands on the steering levers and an expression of grave professional competence. He had been told to keep the crawler on the trail, maintain a constant speed and avoid touching anything else. He had therefore touched everything else before arriving and was now trying to remember which lever made it stop.

Serj, Moe and Rbra were nowhere to be seen. In the cargo bed, the same three crates sat exactly where Rbra had strapped them down.

The checkpoint platoon spread across the trail. MPs raised their laser rifles. The crawler approached at six miles per hour, which was its top speed under ideal conditions and also its emergency stopping distance.

Bo pulled one lever, then the other. The crawler turned sideways. He pulled both. It stopped with its front skid resting against the third lieutenant's hut.

The third lieutenant came out wearing the confused expression of a man whose carefully arranged corruption had returned without the correct participants. He looked at Bo. He looked at the crawler. He looked under the crawler without bending far enough to see anything useful. "Where are the others?" he asked.

Bo held out the papers. They were the same forged papers Moe had handed over before. One corner still carried the third lieutenant's thumbprint. The lieutenant knocked them from Bo's hand and the pages drifted slowly to the ice. "Those are fraudulent."

"I know," Bo said. "You were expecting something different?"

The lieutenant pointed at the cargo bed. "Show me what's in those crates."

"Okie dokie." Bo climbed over the seat, stepped on the glove compartment and fell backward into the cargo bed. The weak gravity allowed him enough time to decide this had been intentional. He got up, released the first strap and opened the crates.

The first contained toilet paper. The second contained soap, razors, toothbrushes, toothpaste, foot powder, antifungal cream, combs, towels and three gross of military suppositories packed in cosmoline. The third

contained more toilet paper, because every quartermaster understood which part of civilization failed first.

The lieutenant stared into them. “Where is it?”

“What?”

“The contraband.”

Bo gestured proudly at the cargo. “This is the contraband.”

“This?”

“What’d you think we were smuggling, gold bars or something?”

The thought had crossed the lieutenant’s mind. It had, in fact, crossed his mind several times in increasingly specific denominations.

He looked toward the empty cab. “What happened to the others?”

“Oh, they got blown up in the TURTLE. Tungsten something.”

The lieutenant studied Bo’s face for any sign of deceit. He found none. Bo’s face was not equipped for deceit unless somebody explained it with pictures.

“Off the crawler.”

Bo hopped down.

The lieutenant pointed beneath the vehicle. “You two. Inspect the undercarriage.”

Two MPs knelt beside the left track assembly. The crawler had no wheels and very little undercarriage in the automotive sense. It had sixteen armored track units, steam pipes, piston housings, skid linkages, a reactor shield, three condensers, two belly pans and hundreds of recesses designed by engineers who had never expected anyone to inspect them while wearing a space suit.

The first MP shone a lamp into a gap beside the transmission. Something inside shifted. “What was that?” he asked.

“Probably a pipe,” said the second MP.

“Pipes don’t shift.”

Before either could improve upon this observation, a corporal ran from the geodesic hut waving a message slate. “Sir! Priority order from battalion command. You’re ordered back to the carrier ASAP.”

The third lieutenant closed his eyes. Promotion, disgrace, or an audit

awaited him in orbit. Since all three began with priority messages, the distinction did not help. “All right. Keep searching,” he told the MPs. “I’ll confirm it.”

He went into the hut.

Bo crouched beside the inspection team. “Do you need help looking for secret compartments? Or raccoons?”

“Stand back.”

“I know some great places raccoons can hide.”

Both MPs looked at him. “Under a crawler?”

Bo smile, “Several of each, in fact.”

The MPs returned to the belly pan.

“What are you hoping to find?” Bo asked.

“Contraband.”

“You already found it.”

“We found toiletries.”

“Exactly.”

“Shut up.”

Bo lowered his voice. “Should I tell you when I’m shutting up or will you tell me that too?”

One MP crawled beneath the condenser housing. Bo followed on hands and knees, asking whether the crawler had get up and go, whether get up and go counted as a secret, whether people could be contraband and whether something remained hidden if it only looked like a raccoon.

The MP stopped probing the precise cavity in which Moe was wedged and backed out to threaten Bo.

The second MP found a loose panel near the reactor shield. Bo leaned over his shoulder and asked if opening it would let the plutonium out. The MP decided it probably would and tightened the panel instead.

By the time the third lieutenant reappeared, the inspection team had examined every harmless part of the crawler and not one useful part.

The lieutenant ran from the hut toward the waiting hopper. “Orders confirmed. Corporal, you have the checkpoint.”

“Sir, what about the crawler?”

“Keep searching it.”

He climbed into the hopper. Its MP siren began flashing red and blue against the ice. Chemical rockets coughed beneath the fuselage, found their balance and lifted the little craft vertically over the hut. It pivoted toward the carrier’s track across the sky and roared upward.

Everyone watched.

A red laser pulse rose from beyond the next ridge. The beam existed for only a millisecond, too briefly for an eye to follow, but the ruby-red afterimage remained. A bright hole appeared in the hopper’s left propellant tank. The craft rolled, fired three maneuvering jets in opposition to one another and descended behind the horizon.

Several seconds later it struck the ground a few clicks downrange. The flash arrived first. A swelling globe of debris followed. The sound did not arrive at all.

The MPs panicked with admirable unity.

“Officer down!”

“Get the rescue sled!”

“Which direction?”

“The direction with the fire!”

The checkpoint emptied. Soldiers ran for motorcycles, a crawler ambulance and anything else capable of moving faster than their superior’s chances of survival. Within a minute only the geodesic hut and one abandoned clipboard remained.

Bo climbed into the driver’s seat. He lowered the barrier by driving through it. The crawler continued along the trail with Bo whistling the theme song to championship wrestling.

Two clicks beyond the checkpoint, something began banging beneath the floor.

Bo looked down. The banging came again: three knocks, a pause then two more. He waited to see if any more bangs occurred. He had to be sure it wasn’t a raccoon. He kept driving until finally the banging returned violently. That had to be them; raccoons were more musical. He pulled both levers and the crawler halted.

A belly panel dropped open. Moe crawled out first, unfolded himself and

lay on the ice laughing. Serj emerged behind him with toilet paper padding tied around both knees. Rbra came last, dragging one of the inspection lamps the MPs had accidentally left beneath the chassis.

Moe got to his feet and slapped Serj's hand. Serj slapped back.

Bo watched carefully. "I thought high fives were supposed to be higher up in the air."

"Good work, kid," Moe said, holding his palm out flat.

Bo tried to slap it but missed.

Serj climbed into the cab and took the controls. Moe joined him, still laughing. Rbra looked at the empty passenger space, looked at Bo and made a decision that punished both of them. "In the back."

Bo climbed into the cargo bed beside her. Rbra pulled the straps tight across the three crates and then, after considering him, pulled a fourth strap across Bo.

"Did I do good?" he asked.

"You told them we got blown up."

"I thought you were for a moment."

"You nearly showed them where we were."

"I tired. Honest."

Rbra grumbled and faced away.

The crawler gathered speed, which took the better part of a minute. Behind them, the checkpoint disappeared around the curve of the trail. Ahead, the black-and-white ground stretched toward the battle line and whatever Serj intended to do with three crates of contraband toiletries.

CHAPTER TWENTY THE LOW ROAD

The ancient object that made Valhalla had not merely struck Callisto. It had attempted to take Callisto apart.

The impact basin was nearly four thousand kilometers across if one counted the concentric rings, which the Jupiterian military did whenever it wanted the map to look conquered. The collision sent stresses through the moon's mixed crust of rock and water ice. The crust cracked. Later impacts cracked the cracks. Tidal flexing from Jupiter worked those fractures back and forth by small amounts for billions of years, because Jupiter was patient and had nothing better to do.

The large fractures were called valleys. The smaller ones were called crevasses, although a Callistan crevasse could be ten to thirty meters wide and descend for two kilometers before darkness made further measurement a question of faith. They opened and closed during icequakes. A gap narrow enough to jump in the morning might be wide enough to lose a crawler by lunch. Slabs sheared from the walls without warning and fell into the abyss, where they struck other slabs and continued the local geological tradition.

No prudent mooninite went near them.

Thirty to fifty meters below the surface, hidden roads had been carved into the nearly vertical walls. They were not roads in the official sense. Official roads had shoulders, signs, guardrails, survey numbers, not to mention officers claiming credit for them. These were shelves cut into blue-gray ice, barely wide enough for one crawler. In places the outer track ran so close to the edge that its cleats threw crumbs into darkness. The inner side scraped the wall. Steam pipes buried beneath the surface warmed the ice just enough to keep it from becoming glassy, then refroze their own condensate into ridges that punished speed.

The Jupiterian military would never have sanctioned such a route. No responsible Callistan contractor would have built it. No insurer would have recognized the words used to describe it.

Only smugglers had the necessary combination of engineering skill, secrecy and poor judgment. Serj's gang called it the low road.

The crawler entered the crevasse at 2100 through what looked like a collapsed artillery trench. Serj drove between two leaning ice blocks, turned sharply then dropped onto a ramp hidden beneath pulverized regolith. The surface battle disappeared above them. Rifle flashes

ceased. Tungsten volleys vanished. Even Jupiter was cut from the sky by the closing walls.

At the bottom of the ramp, Serj switched off the crawler's military transponder.

The crawler continued along the wall, thirty-seven meters beneath the surface and more than a kilometer above the unseen floor.

It was safe by smuggling standards. Spy satellites could not see through the overhanging ice. Ground radar lost the road among thousands of natural fractures. Artillery aimed at the surface passed overhead. Anyone wishing to ambush the crawler would first have to discover the route, then reach it, then wait on a shelf where two vehicles could not pass each other and nobody could turn around.

They had the low road entirely to themselves. This was fortunate, because they required five hours to travel less than fifty miles.

Bo rode in the cargo bed with Rbra and the three crates. He had been awake for almost twenty-four standard hours since reaching Callisto, which qualified as his first day on the moon even though astronomical morning had begun long before he arrived and would continue for days after he slept. A full Callistonian day lasted about four hundred hours. Morning alone lasted roughly one hundred. Human beings had solved this inconvenience by keeping twenty-four-hour clocks and refusing to let the sun participate.

For the first hour, Bo could not stop looking over the edge. The crawler's headlamps illuminated the opposite wall thirty meters away. Bands of clean white ice alternated with darker layers of silicate dust, impact debris, and the powdered remains of spacecraft accumulated over ages. The stripes bent and fractured like pages in a book that had been frozen, dropped and shelved by an artilleryman.

Below the road, light fell a few hundred meters and was swallowed. Occasionally an ice shard turned in the darkness. It caught the headlamps once, flashed blue, and continued falling for so long that Bo forgot it existed before it vanished.

At 2215 they reached the first bridge.

The road ended at a fresh vertical fault that split the crevasse wall and lifted the next section six meters above them. Engineers had spanned the break with an accordion bridge: a folding structure of interlocking steel plates supported by nested trusses, sliding rails and hydraulic joints. One end was anchored to each shifting wall segment. When the crevasse

widened, the bridge unfolded. When it narrowed, the plates nested together. Vertical jacks raised or lowered the far end as the ice crept. It was less a bridge than a folding ruler somebody had taught to survive icequakes.

Serj stopped. Moe climbed down to inspect the expansion marks. He kicked one hinge then waved them forward.

The crawler crept onto the bridge. The steel groaned through the vehicle's frame. The outer edge had no rail. Halfway across, an icequake passed through the wall as a slow shiver. The bridge extended eleven centimeters beneath them with a sequence of metallic bangs.

Bo pressed both hands to his helmet. "Can we do that again?"

"Quit thinking," Rbra said.

They crossed a second accordion bridge forty minutes later. This one bent around a corner while descending, which Moe insisted called for a toast. Serj insisted he drink first. Rbra insisted both men stop drinking and drive.

By 2300 the excitement had become too much for Bo. His head tipped forward. He woke when his helmet struck a crate. He watched the road for five minutes, fell asleep again, woke when the crawler leaned toward the abyss, asked if they had arrived and fell back asleep before anyone answered.

Rbra examined the arm he had landed on after the TURTLE explosion. The suit sleeve had hidden the swelling. The forearm bent slightly where forearms were not intended to express an opinion. She cut away the mismatched outer fabric then yanked the bones into alignment. Bo did not move. She swore then locked a rigid pressure splint around his arm and cinched it tight.

"He's sound asleep," Rbra's hoarse voice said, inside his helmet. "I set his broken arm and he didn't stir."

Maybe Bo just dreamed she said it.

The crawler's tracks clanked beneath him. The words from the cab arrived through the open helmet channel when the vehicle bounced, then faded when Bo slid to the back of the cargo area, carrying the speakers beyond range. Sentences came and went. The engine became wind. The ice became waves.

Moe's voice said, "Why are we still doing this after all these years?"

“Doing what?” Serj asked.

“Smuggling bathroom supplies through a battlefield. Hiding from lieutenants under machinery. Getting shot at for cigars.”

“Those were good cigars. Quit hogging that flask.”

Moe handed the flask back. “You can retire on Ganymede anytime you want. You know that right?”

“For how long?” Serj said, between swigs. “Jupiter has a way of always catching up. With me, with you. With all of us.”

A pause followed, filled by the steady beat of steam pistons.

Moe took the flask back. “Still waiting for the big score, huh?” he said.

“Yeah, one big score. Big enough to outfit a proper ship. Not some hopper. Not a crawler with rockets tied to it. A real ship. Fuel, food, shielding, water and papers that work farther than the next checkpoint.”

“And then what?”

“We leave Jupiter space behind.”

Moe laughed softly. “Where you gonna go, Uranus?”

There was along pause before Serj replied. “Earth.”

Rbra’s voice came from beside Bo. “Earth? Which moon is that?”

“It isn’t a moon.”

“Everything useful is a moon,” Moe pointed out.

“Earth is a planet,” Serj said. “The first one. Where humans came from.”

“Humans come from vats.”

“Now they do.”

Bo opened his eyes. He saw blue ice sliding past. For an instant Serj’s words seemed to shine within it like fossils trapped beneath the road.

“Ancient humans lived on Earth,” Serj continued. “Billions of them. They built cities across whole continents. They crossed oceans and went into space before anybody had a proper Jupiterian gravity well to help them.”

Moe asked, in the patient voice of a man feeding coins into a machine, “How fast were their ships?”

“Faster than light.”

“Naturally.”

“They could travel between stars in an afternoon. They had thinking machines that knew every answer before the question was asked.”

“Were the machines smarter than officers?”

“They thought they were gods.”

“So no.”

Rbra said, “If Earth is real, why isn’t it on military maps?”

“Because it’s too far away. Because the government erased it. Because the machines hid it. Depends which old recording you believe.”

“What happened to the ancient humans?” Moe asked.

The crawler rounded a bulge in the wall. The radio faded. Bo heard only fragments.

“…oceans…”

“…monsters bigger than carriers…”

“…came out of the deep…”

The channel opened again.

“Sea monsters?” Moe asked. “Actual sea monsters?”

“Giant ones. Tentacles a mile long. Teeth made of crystal. They climbed onto the continents and fought the humans.”

“What did the thinking machines do?”

“Declared themselves gods and fought everybody.”

“Humans and monsters?”

“And each other.”

“Who won?” Rbra asked.

“Nobody knows. Earth disappeared.”

“Planets don’t disappear.”

“This one did.”

Moe sounded delighted. “Any treasure left?”

“Enough for the biggest score there ever was.”

Bo could no longer tell whether Serj was speaking, whether Moe was

inventing the answers, or whether the crawler itself had begun telling him a bedtime story. The wall beyond the cargo bed softened into an ocean of blue ice. The accordion bridges opened and closed like metal gills. Far beneath the road, something enormous turned in black water.

Bo slept. He dreamed that Saturnians rode giant sea monsters through the sky. The monsters had crystalline teeth and tentacles a mile long. Their riders wore black armor, spoke French and hurled spears of lightning at him while redistributing treasure to poor people.

Bo met them on an accordion bridge above a bottomless ocean. He had no rifle, only a coffee dispenser. Rbra rode beside him on a white sea monster and winked at him provocatively. Serj stood at the wheel of a ship big enough to leave Jupiter forever. Moe wore sunglasses despite there being no sun.

Bo wrestled the largest monster. It threw him through a mountain. He landed on his broken arm and felt nothing. Rbra came over and kissed him on the lips. It was a good dream.

At 0200, the crawler reached its destination. Bo slept through that too.

CHAPTER TWENTY-ONE MEAT PLANKS

Bo was awakened by falling out of his bunk at 0900.

For one brief moment he was in free fall. Callisto still pulled him downward, but the floor had not yet pushed back, so his half-asleep body reported zero gravity and considered the matter under advisement.

Then his face struck the floor.

The impact knocked something loose inside his head. It rattled when he turned left, rolled when he turned right and settled somewhere behind his nose when he lay still. Bo listened to it for several seconds and decided it was probably supposed to be there. It continued rattling for the rest of the morning.

None of this actually woke him. The smell of bacon did.

Bo opened his eyes against blue ice. The floor was incredibly cold where it touched his cheek and his bare hands. His breath steamed in front of him, spread across the floor, and froze as a delicate fog against the wall.

The bunk room was barely large enough to contain six bunks. They were stacked three high on opposing walls with a narrow gap between them, so a sleeper on one side could reach across and steal from a sleeper on the other without getting up. Pale blue plastic curtains covered each berth. The fourth wall was another plastic curtain, behind which the corridor made a slow horizontal curve through the ice.

Bo was still wearing his mismatched space suit. One sleeve ended farther down his hand than the other. His broken arm was enclosed in a rigid pressure splint. His helmet and gloves were gone. So were the coffee tank, the hose and the nozzle belonging to the 1701st Logistics Battalion. Long live the 1701st!

He sat up. Something in his skull rolled forward and clicked. “Hello?” he asked it.

It did not answer.

Bo stood and sniffed the air. Bacon or at least what he remembered bacon smelling like back on the farm.

He pushed aside the curtain of the lowest opposite bunk. Empty. He checked the bunk above it. Empty. He climbed halfway into the top berth and found a pillow, two socks and no bacon. He searched all six bunks because bacon was known to conceal itself in unlikely places.

The smell came from beyond the room.

Bo stepped through the plastic curtain and followed it down the curving corridor. The curve ran sideways rather than up and down, unlike the rotating ring aboard the Arley Mith. Here the corridor bent because it had been melted and carved around natural stresses in the ice. Ribbed metal frames held the ceiling apart at five-meter intervals. Frost feathers grew around each frame where warm, damp air found colder structure.

The gravity was low enough that walking seemed wasteful. Bo hopped.

He bounced around the curve and entered a domed room at the center of wherever he was.

It was about seven meters across and four meters high, carved directly from solid blue ice. Clear patches in the walls revealed white bubbles and black mineral grains trapped within Callisto for geological ages. Electrical conduits and water pipes ran through shallow grooves, then disappeared beneath translucent ice patches intended as repairs. Several round metal tables occupied the center. Chairs were fastened to the floor by magnets so that enthusiastic diners could not launch the furniture across the room.

Galley equipment surrounded the dome: heating plates, pressure ovens, water reclamation taps, cold lockers cut into the wall and a grease hood that vented into a filter blackened beyond chemistry.

The air was warmer. Bo could barely see his breath.

At one cooking station, a woman stood with her back to him. She had the same broad-shouldered soldier build as Rbra and wore thick white clothing with fur around the neck and wrists. One trouser leg ended below the knee. She balanced easily on the other leg while turning three dark slabs on a hot plate.

The dark slabs produced the smell. Bacon.

“Rbra!” Bo called.

The woman looked over her shoulder. “Sit down.”

Her voice was low and husky. It was not Rbra’s voice. Her face was not Rbra’s face either, but Bo sat down because the bacon had given the order additional authority.

She hopped to the table carrying a metal plate. On it lay three thick slabs of a dark red meatlike substance. They were rectangular, crisp at the edges and streaked with glistening fat that had never belonged to an

animal. The government called them Combined Ration And Protein Units. Everyone else called them meat planks.

They tasted neither like bacon nor canned pork, nor any other animal bred to slaughtered.

Bo looked up at the woman. “You’re not Rbra.”

“I’m Ricia.”

Now that she faced him, Bo noticed everything regulation had failed to approve. Ricia had only one leg. Her skin was an illegal shade of green, deep and clean like the skin of an unripe fruit. Jupiterian soldier factories recognized tan, white, black and certain economical grays. Green appeared nowhere on the approved pigmentation chart. Her hair was bright orange and tied behind her head with wire.

“What’s your problem?” Bo asked. He did not mean it harshly. He truly wanted to know which manufacturing problems had produced the leg, the skin, and the hair and whether they rattled.

Ricia stared at him for one long second, then returned to the hot plate.

Bo leaned close to the food. He had no utensils. He selected one plank, touched it with his tongue, and discovered salt, smoke flavor, grease, sweetness and something medicinal. He licked it again to make sure.

An old man entered the dome. He did not hop. He slid around the curve in thick socks, using the low gravity and the polished ice like a man who had spent decades refusing to lift his feet. His pajamas were covered with yellow ducks. The ducks wore tiny naval caps. His hair formed a white fringe around a bald head, and his face had enough wrinkles to prove it had not come out of a mold recently.

He slid to Bo’s table, caught the chair with one hand and plopped down beside him. The old man looked at Bo. Then he looked at the plate. Then back at Bo. “You gonna eat that?”

Bo placed a protective hand over the meat planks. “I don’t know. What it is?”

“You, my good man, are in need some instruction.” The old man decided it was prudent to teach Bo how to eat.

He picked up a plank with both hands, bent it until the surface split and tore away a strip with his bare teeth. There were no utensils, so this seemed to Bo like a legitimate demonstration rather than theft.

“You grip it here,” the old man said through the food. “Use the side

teeth. Front ones are decorative."

He demonstrated again. Then again. By the time Ricia returned with another plate, he had eaten most of Bo's breakfast. "Thanks," he said, taking the new plate too.

Ricia shrugged. "His baby intestines probably couldn't handle it anyway."

Bo looked down at his abdomen. "They're not babies."

"How old are they?"

Bo counted backward from the day he woke up after the farming accident, became confused by the two-week voyage and stopped.

The old man held out a greasy hand. "Arles. Oldest private first class in the fleet."

"How old?"

"Old enough to know better. Not old enough to stop."

Bo shook his hand. Arles kept Bo's fingers long enough to examine the mismatched sleeve and the pressure splint.

"You stick with me," Arles said. "I'll teach you everything you need to know."

"Like what?"

Arles leaned closer. "The truth."

The ducks on his pajamas gathered around the table. He made as if to speak several times, stopping just before words came out. Some moral calculation was churning inside his head making him hesitate. Bo wondered if this is what Phompson meant when he said the word 'authentic.'

Arles finally made his decision and said, "The soldier factory. The childhood they put in your head. Granny. All of it."

Bo stopped reaching for his breakfast. "What about Granny?"

"She was never real."

The room seemed to become colder.

Arles continued in the calm tone of a man discussing weather. "There was no farming accident. Io was never a farm. You never grew up there. They grew you in a mold, fed you an education program and planted a

family memory so you'd obey people who sounded familiar."

Bo waited for the joke. Arles did not smile.

"I remember Granny."

"Of course you do. That's why it works."

"I remember her barn."

"A recording."

"Her hands smelled like flour."

"Sensory reinforcement."

"She made green potatoes."

Arles paused. "That part may be damage."

Bo's loose internal object rolled from one side of his skull to the other. "Why would they lie?" he asked.

"To keep you in line. To control you. A soldier with a childhood thinks he has something behind him and something to fight for. A soldier who knows he was poured on Tuesday asks for back pay."

Bo looked toward Ricia. "Is that true?"

Ricia turned a meat plank. "Don't listen to him, Bo. He's not right."

"Which part?"

She did not answer.

Arles tapped his forehead. "There's a machine that can wipe the false memories away. Clean slate. No Granny, no farm, no patriotic bedtime stories. I can do the procedure on you if you like. I'm certified."

Bo recoiled so quickly his magnetic chair came loose from the floor. "Hell to the no, thank you."

"Doesn't hurt much."

"I said, no!"

Ricia hopped over with her own plate. Unlike the men, she carried a fork and knife. "You are not certified."

"I completed the correspondence course."

"You completed half the correspondence course."

"Yes it was a half correspondence course and I completed all of it."

“You drilled through Pell’s ear.”

“She moved.”

“Pell was sedated.”

Arles pointed a meat plank at her. “Medical science requires confidence.”

“Medical science requires anatomy.”

“I know where the brain is.”

“You just pointed at his spleen.”

While they argued, Bo watched Ricia. “What about Granny?”

Ricia cut her breakfast into precise squares. “Your arm needs imaging.”

“Was she real?”

“You also have a head injury and a wandering eye.”

Bo looked back at Arles. “Did everybody get Granny?”

Ricia put a square of meat plank in her mouth and chewed until the question had become somebody else’s responsibility.

Arles smiled. “See?”

Bo looked at the half-eaten plank remaining on his first plate. He needed something in his mouth that was not a question. He snatched it back from Arles and swallowed it in one bite.

The plank entered sideways. Bo made a surprised noise. His eyes widened. He stood, struck the table and fell over backward with both hands at his throat.

“Furthermore,” Arles said, “the memory extractor’s warranty only expired because the manufacturer no longer exists.” He looked down at Bo flailing on the cold floor. “You okay down there, buddy?”

Ricia kept arguing as she rose. “The manufacturer never existed. You built it from a mining laser and a hair dryer.”

She hopped behind Bo, hooked her arms beneath his ribs and drove upward. Callisto’s low gravity made a normal Heimlich maneuver inefficient, so she planted her one foot beneath a floor brace and used it for leverage.

The meat plank launched from Bo’s mouth, crossed the dome and stuck to the ice wall. Bo drew a ragged breath. The object in his head rattled in

applause.

Ricia released him. “Come on, kid. Let’s get you checked out properly in the medical bay.”

Bo followed her toward the corridor, rubbing his throat. “I’d rather have Rbra examine me.”

“Rbra isn’t a medic.”

“She fixed my arm.”

Ricia looked at the splint. “She put it on backward.”

They disappeared around the curve.

Arles remained at the table with both plates and the yellow ducks. “My machine can fix that too!” he called after them. “Probably!”

CHAPTER TWENTY-TWO BO GETS SOME REPLACEMENT PARTS

Ricia took Bo to the medical bay via the hallway on the far side of the mess hall, opposite the bunk rooms.

The entrance was another pale plastic curtain. Above it, MEDICAL had been painted on the ice in red letters.

The bay was a narrow oval chamber melted from blue ice and lined with shelves. Frosted jars, surgical tools, spare suit fittings, pressure dressings and unlabeled organs occupied the shelves in no medical order Bo could understand. Warm pipes ran behind a metal counter. Their heat made the wall sweat. The water crawled downward for a few inches, froze, and built transparent ribs beneath every bracket.

In the center stood an old examination chair. It looked like a dentist chair designed for an old Ionian science-fiction horror program. Its cracked black cushions were mounted on a hydraulic pedestal. Jointed steel arms hung overhead, ending in lamps, mirrors, drills, clamps, and one object that appeared to be a kitchen whisk. Thick cables entered the base through ceramic insulators. A white enamel control box bore two settings: DIAGNOSE and MODIFY. Somebody had crossed out DIAGNOSE.

“Sit,” Ricia said.

Bo sat.

Leather restraints closed over his ankles, waist, and chest. He looked down at them.

“Are those necessary?”

“Not usually.”

“Why are you using them?”

“You ask questions.”

Ricia began with what she called a full examination and what Bo considered a search. She listened to his chest through the space-suit fabric, struck both knees with a rubber hammer, tested the pressure splint, looked into his ears and found nothing useful in either one. A scanner passed over his abdomen and produced a picture containing several unfinished loops, two dead ends and a blinking warning triangle.

She opened an access flap at his waist. The colostomy bag beneath it had swollen to the size of a loaf of bread. Ricia pinched the connector, twisted the bag free then held it at arm's length. "That's full."

"It was empty yesterday."

She dropped the bloated bag into a disposal chute. Something below accepted it with a soft, wet thump.

Ricia searched three drawers and a locker until she found a cardboard box labeled EMERGENCY GASTROINTESTINAL. The box contained two shoe covers and a corkscrew. "Fresh out of bags," she said.

"What do I use to poop?"

She screwed a stainless-steel cap onto the abdominal port. "That."

"I don't think there's enough room in that little thing. Where does it really go?"

"Nowhere."

Bo considered this answer and chose not to explore it while restrained.

Ricia consulted the scanner. "You need two operations."

"But I just woke up."

"One to replace the broken arm. One to correct the crossed eyes."

Bo stared at her with both eyes making independent assessments. "There's nothing wrong with my eyes."

Ricia held up both hands. "How many fingers?"

Bo counted. Some fingers overlapped. Others appeared twice. One moved from hand to hand while he watched. "Fourteen," he said with confidence.

She nodded as if he had answered correctly. "You have a preference? Eyes or arm first?"

Before Bo could answer, Ricia took a small steel tool from a tray. It resembled a screwdriver made for a very expensive watch. She inserted it into a narrow service slot in his suit near the shoulder of the broken arm.

"Wait," Bo said. "I'm still thinking."

Ricia turned the tool and the suit snapped shut.

A circular emergency seam contracted around Bo's shoulder faster than

a camera shutter. Monomolecular closure wires passed through suit fabric, seals, skin, muscle, and bone. The broken arm dropped to the floor inside its loose sleeve without spilling a drop of blood. At Bo's shoulder, the suit formed a rigid metal cap over the short remaining end, sealed it against pressure loss, and injected coagulant foam before his nervous system had time to notice.

Bo looked at the arm on the floor. He looked at the empty space beside him. He looked at Ricia. "You didn't give me time to think about it."

His pain had enough time to think about it and decided to let Bo know what it thought.

Bo threw his head back and howled at the blue ceiling. The sound crossed the medical bay, entered the ice and returned as a quieter howl from several directions. The loose object inside his skull rattled furiously.

"Excellent. That means your nerves are still functional," Ricia said.

She opened a small refrigerator beneath the counter. Cold vapor spilled around her one foot. Inside were six frosty tubes in a rack: ARM, ARM, LEG, ASSORTED DIGITS, EYE and LIVER-GREEN.

Ricia selected an arm tube and placed it in a machine on the counter. The machine looked like a toaster oven bolted to a metal lathe. A glass lid covered a cylindrical chamber. Chucks at either end gripped the frosted tube while induction coils warmed it. A label warned: DO NOT USE FOR FOOD, AMMUNITION OR RECREATIONAL REPRODUCTION.

Ricia closed the lid and pressed START. For thirty seconds the machine whirred, hammered, hissed, and played three notes of a patriotic song. The tube expanded. Protein scaffolds unfolded. Preserved cells absorbed warm nutrient gel and inflated along pre-printed vascular channels. Bone hardened from the inside out while the outer tissue remained soft enough to connect.

The lid popped open revealing a brand-new full-sized arm lay inside. Perfect in every since except it was white. Not pale tan. Not close enough under poor lighting. It was regulation white from shoulder to fingertips, with faint blue veins and a stainless-steel coupling cap where it connected to the body.

Ricia lifted it out by the wrist.

"That's not my color," Bo groaned.

“It’s your size,” she said, orientating it against his shoulder and tilted her head back to see a wider view. “Mostly.”

“What other colors you got in there?”

Ignoring him, she aligned the cap with Bo’s sealed shoulder. Guide pins found their slots. She pushed until the couplings met and twisted the arm a quarter turn. It snapped into place.

Inside the cap, hollow nerve bundles met conductive graft pads. Arteries and veins pierced self-sealing membranes. Bone anchors extended into the shoulder socket. A pump in the new arm cycled twice, drawing Bo’s blood into vessels that had belonged to nobody thirty seconds earlier.

Bo looked down. The white arm hung beside him, motionless. “It didn’t work. It still hurts.”

“Give it an hour or two. If you don’t feel anything, it means it didn’t take and we’ll have to try again.”

Bo looked up at the ceiling and whispered, “Please don’t work.”

Ricia picked up the old arm. She pulled the mismatched suit sleeve from it as if removing a glove, dropped the bare limb into a trash compactor and shut the lid. The compactor made one decisive crunch.

Bo watched her slide his old sleeve over the new white arm and zip it to the torso section.

“Why haven’t you gotten a new leg for yourself?” he asked.

Ricia paused, but did not answer.

She rolled a wheelie chair from beneath the counter, sat in it and pushed herself toward Bo with her foot. In the low gravity the chair glided too far. She caught the examination chair, pulled herself back then took a penlight from her pocket.

“Follow the light,” she said, shining it into his left eye, then his right. “Look left. Right. Up. Down.”

Bo obeyed. Each eye pursued the light by a different route.

“Does a new leg hurt?” he asked.

“Look left.”

“Did your old one get blown off?”

“Right.”

“Was it green too?”

“Up.”

“Can the arm machine make legs?”

“Down.”

“Did Arles try to fix it?”

“Straight ahead.”

Bo looked directly at her and the fork.

Ricia stabbed one of his eyeballs with a tiny surgical fork. The tines entered on either side of the pupil. She twisted hard, releasing the retaining muscles and pulled. Bo’s eye came out with a wet pop followed by several centimeters of optic filament.

“What the hell, woman!” Bo shouted. He tried to sit up but the restraints did their job.

Ricia clipped the filament and dropped the eye into a specimen dish. It rolled in a slow circle, continuing to look at Bo from the counter.

She handed him a clean cloth. “Hold this over the socket.”

Bo pressed it to the empty side of his face with his good arm. The new arm dangled uselessly beside the chair.

“You keep doing things before I agree.”

“You agreed to an examination.”

“That wasn’t an examination.”

“I examined it after removal.” Ricia opened the refrigerator again and selected the tube marked EYE. Unlike the arm tube, it was long, narrow and red. A transparent section showed a pale sphere suspended in nutrient gel at one end.

She warmed it between her hands after snapping off a protective cap. “Nice,” she said and returned to Bo. “Hand down.”

“No.”

“Won’t hurt a bit.”

Bo lowered the cloth reluctantly.

Ricia jammed the red tube into the empty socket.

Bo gripped the chair with his old hand. His new hand did nothing. Ricia

braced the tube against his brow and pressed the plunger. Gel entered first, flushing the socket. The replacement eye followed, folding slightly to pass through the applicator before expanding inside his skull. Artificial cilia found the cut optic filament. Muscles grew adhesive hooks and caught the orbital anchors.

“Aaaaah!” Bo screamed, “You said it wouldn’t hurt.”

The injector made a cheerful click and with a sigh of satisfaction, Ricia withdrew it. “I didn’t say who it wouldn’t hurt.”

Bo immediately raised the cloth again and screamed again.

“No.” She caught his wrist. “It needs light to calibrate properly. Look at me.”

Bo struggled against her arm and decided to give up.

He opened both eyes. The new one saw only red fog. Then it saw white light, blue ice, green skin, orange hair and the hard lines of Ricia’s face. The old eye sent its familiar tilted picture. The replacement compared the two images, adjusted its focal length then pulled the old eye into agreement through linked motor reflexes.

Bo blinked. The medical bay became one room instead of two rooms occupying similar locations. Ricia became one woman. She had one nose, one mouth, one remaining leg and exactly five fingers on each hand.

Bo could see straight for the first time in his life. Deep inside his head, the thing that had been rattling rolled once toward the new optic socket. There was a faint click, as if some loose part had finally found where it belonged and the rattling stopped.

Bo stared at Ricia. “You’re greener than I first thought.”

“Thank you.” And she meant it.

CHAPTER TWENTY-THREE TARGET PRACTICE

Serj and Rbra woke at the crack of noon.

They occupied another six-bunk room farther down the curved corridor from the one where Bo had slept. Only two berths appeared used: the bottom bunk and the one directly above it. Their blankets, clothes and equipment had become mixed enough that nobody could say with certainty who slept where. The remaining bunks held a box of detonators, a frozen rabbit and nothing helpful.

They shared the shower. The stall had been designed for one soldier and could hold two if neither required privacy or room to turn around. Steam clouded the plastic curtain. Their voices remained low, practical and impossible to distinguish from an argument. They emerged separately, fully dressed, carrying their own equipment. Serj complained that Rbra had used all the hot water. Rbra said nothing. Neither looked at the other. They entered the mess hall carrying metal cups of coffee.

Bo sat at the same table where Arles had stolen his breakfast. He was looking at the world from a new perspective and through a new eye.

His replacement arm had begun to work. It tingled from shoulder to fingertips as the grafted nerves learned which electrical signals belonged to Bo and which were misfires left over from refrigeration. When he told the hand to close, it usually waited, considered the request and performed some portion of it. The thumb remained neutral, as if waiting to see who would win.

His vision required no such negotiation.

Bo stared at the saltshaker. For the first time he could see one shaker instead of two overlapping shakers and knew which set of holes the salt would emerge from. He examined individual pepper grains through the glass. He studied the tiny heating coils in the galley toaster, the screws in a coffee grinder, the seam around the ceiling vent, even the trapped bubbles inside the blue ice wall.

He held both hands before his face. The old hand was tan. The new one was white. Each had exactly five fingers, and none moved from one hand to the other while he counted.

Rbra stepped into his field of view. Bo looked up and his mouth fell open. “Oh my Scrod,” he said. “You’re more beautiful than ever.”

Rbra set down her coffee. She crossed the mess hall, seized Bo by the

chest straps and lifted him out of his chair. Callisto's gravity made the operation easy, but the speed suggested she would have attempted it on Jupiter.

"I don't think your replacement eyes are working very good," she said, giving him a rough shake. "Let's get those out of there for a quick examination."

Bo felt like drooling.

Serj drank his coffee. "Put him down."

Rbra held Bo for another second so he would understand that gravity, not mercy, had saved him. Then she released him. He descended slowly, missed the chair and sat on the floor.

Serj looked down at him. "Ready to find out if that new vision is worth something?"

Bo nodded.

Serj led him out of the mess hall. Rbra remained behind, fuming into her coffee and considering whether eye removal required authorization in a smuggler base.

The corridor beyond the galley straightened and ran fifty meters through the ice. Unlike the curved living passages, it had been cut along a stable fracture and lined with metal ribs. Frost coated the floor. At the far end waited a circular airlock hatch surrounded by faded yellow paint.

Their gloves and helmets hung inside the lock. Someone had removed Bo's coffee equipment, but one rifle rested in a wall rack.

Bo sealed his helmet. The old woman's prerecorded suit voice returned immediately. "CONGRATULATIONS ON NOT DYING B-7331. ANOTHER EXCITING DAY OF FIGHTING AWAITS YOU."

"But I've been reassigned," Bo complained.

Serj found a tiny cable in the back of Bo's suit and yanked it out as the voice began saying "DO NOT CONVERSE WITH…" The cable must have fed the internal audio because the voice suddenly ended with a guttural stop.

"Thanks, I guess."

Serj handed Bo his gloves, closed the inner hatch then pumped the air back into the habitat. The pressure gauge fell. Frost flashed across the lock walls as water vapor froze. When the chamber reached vacuum, Serj

opened the outer hatch.

Beyond it lay another long tunnel, but this one held no breathable atmosphere and almost no heat. Their helmet lamps cut through darkness. Ice beneath the lamps appeared black at some angles and luminous blue at others. Every footstep entered the soles of their suits as vibration rather than sound.

The tunnel ended in a dimly lit maintenance cavern. It had been melted from the crevasse wall around a natural void. The chamber was nearly forty meters long, fifteen high and open at one end to the abyss. The low road ran past the opening like a shelf. Beyond it, the opposite wall hung in semi-darkness thirty meters away.

Several crawlers stood beneath work lamps with armor panels removed. Unpowered cargo sleds leaned against the ice. Four motorcycles occupied a rack beside crates of track pins, steam valves and reactor shielding. A mechanic in a pressure suit hopped between vehicles carrying tools tethered to his belt. Nothing could be put down safely near the opening unless its owner wished to donate it to the bottom of Callisto.

Serj raised his helmet radio. “Ick!”

The mechanic slid out from behind a crawler, struck an ice boulder then continued through the air. He caught a hanging chain and swung to his feet. He slow hopped over to them until the short range radio kicked in.

“Bo, this is Ick,” Serj said, motioning at the mechanic. “Ick, Bo.”

Ick’s face was a twisted nightmare of a face transplant gone wrong. One eyebrow sat above the wrong eye. His mouth slanted upward on the left and downward on the right. His nose had been attached at a slight angle, as if its installer had been interrupted. Patches of three different skin tones met along visible seams beneath his clear helmet.

Bo leaned closer. “What’s your problem?”

Ick shrugged. “Didn’t recognize myself in the mirror after hatching. They sent me back for facial rehabilitation.”

“Did it help?”

“The only think I recognized now are crawler parts. So yes.”

Serj said something to him with a few hand gestures and Ick hopped over to a shed near the large opening. He reached in and collected a folded target then hopped toward the far side of the cavern. He planted a

steel base beside the opening and unfolded a regulation training silhouette. The figure had all the usual traps of the enemy: a head, chest rings, scoring marks, and a printed notice reminding soldiers that the enemy might not remain still during actual combat.

The target stood forty yards away with the abyss behind it.

Serj demonstrated with the rifle from the airlock rack. It was an ordinary Jupiterian service rifle built around an extraordinary ammunition system. The magazine held standard laser cartridges of medium yield. The weapon's sights and controls remained where a soldier from any century would expect them.

Serj seated the stock against his shoulder and aimed. He slowly squeezed the trigger. The hammer struck, igniting a thirty-kilowatt red pulse crossed the cavern in a millisecond. The target flashed at the center of the heart ring. A tiny bead of metal vapor froze in the air beyond the muzzle and gently fell to the ground like glitter.

Serj lowered the rifle. "Your turn," he said holding it out to Bo.

Bo accepted it with a smile as he could now see all the components clearly. It felt familiar in his hands. He remembered training rooms, cleaning rods, magazines, instructors shouting, and a weapon refusing to fire unless he had dropped it. But the rifle looked completely different now. Its front sight was one front sight. Its rear aperture was one circle. The target stood in one place.

Bo raised the weapon. He could see the silhouette. He knew where the barrel pointed. For the first time, weapon and target occupied the same visual universe.

He squeezed the trigger but the magazine fell out. It struck the ice between his boots, bounced once, and slid toward the cavern opening.

Serj caught it with one foot. "Try again."

"The release was next to the trigger."

"It's supposed to be next to the trigger."

"That seems dangerous."

Serj reseated the magazine and showed Bo where to keep his white replacement thumb. Bo aimed again. The new arm tingled. His old hand tightened around the grip. The target remained wonderfully singular.

He fired. A red pulse clipped the silhouette's outer edge and left a glowing notch near its elbow.

Bo stared making sure the near miss wasn't an illusion then he jumped for joy.

In Callisto's gravity the jump carried him nearly to the cavern roof. Serj caught his ankle on the way down and prevented him from landing headfirst on a motorcycle rack.

Bo suddenly found himself hugging the sergeant. "I did it. I fired a rifle!"

"Yes."

"And it didn't wound anybody by accident!"

"Also yes."

Bo hugged him harder. Serj endured it with the solemn expression of a man discovering a cost omitted from the plan.

They continued shooting. Bo never again came as close to the target. His third shot passed above its head. His fourth struck the base. His fifth disappeared into the crevasse and might still have been traveling if the far wall had not objected. The replacement arm responded unpredictably, the old hand over-corrected. Bo became so excited by seeing the sights that he sometimes forgot to place them over anything. At least he was having fun.

Serj adjusted his stance. "Lean forward."

Bo leaned too far.

"Not that far. Stock into the shoulder."

"The new shoulder?"

"The other one."

"This one hurts less."

Ick took a break beside a crawler, too close to the line of fire. He inserted a vacuum cigarette through a sealed smoking port in his helmet. The cigarette contained its own oxidizer in the paper and could burn without atmospheric oxygen, although the manufacturer recommended not using it near reactors, ammunition or live weapons fire.

Ick searched his pockets for a lighter.

Bo fired. The beam missed the target, passed through the cigarette's protruding ignition tube, and lit the end without touching Ick's glove.

Ick drew a puff. Smoke circulated inside his helmet and entered a small filter near his chin. "Thanks," he said, with a wave of his hand and went

back to work.

Serj moved Bo three feet to the left. “Aim more carefully.”

Bo sighted along the rifle. “Is Earth real?”

Serj’s hands stopped adjusting Bo’s elbow. “No.”

“I had a dream you told me all about it.”

“It’s a myth.”

“Earth or the fact I dreamed you told me about it?”

“Yes.”

Bo waited for more. Serj gave him none. The dark crevasse occupied the open end of the cavern, and beyond it lay the rest of Callisto, Jupiter space, and every place Serj had not discussed while Bo was awake. “What about sea monsters?”

“Shoot!”

Bo accepted the answer. He aimed again and missed by several feet.

After another half hour of this, Moe appeared in the airless tunnel. His sunglasses were inside his helmet, where they served no practical purpose and yet completed him.

He waved them over and made some hand signal that Serj understoon since they were outside the fifteen foot range.

Serj translated. “Moe wants you to help him prepare dinner.”

“But I haven’t had lunch yet.”

“Do what he tells you,” Serj said, taking the rifle back.

Bo squatted down to hop but stopped short and turned back to the sergeant. “What about you?”

Serj checked the rifle’s cartridge counter. “I have something else to do.” He threw the rifle over his shoulder then hopped in the direction of a recently repaired motorcycle.

Bo shrugged and hopped over to Moe.

Moe looked passed Bo as he spoke. “It’s convenient how everybody has something else to do when I ask for help with dinner.”

Bo looked over his shoulder to see Serj ride out of the base on the motorcycle. “Serj said I could help.”

Moe turned his attention to Bo now and frowned. “I see that.” He studied the fresh burns scattered around the target and the white replacement arm emerging from Bo’s mismatched suit. “You’re a mess.”

CHAPTER TWENTY-FOUR UTMAN YNCHS FUNDING REQUEST

FROM: Utnam Ynch, Acting Field Archaeologist and Provisional Anthropologist, Valhalla Basin Survey Camp Six

TO: The Most Distinguished Allocation Committee, Last University of Jupiter, Department of Useful Knowledge

SUBJECT: Petition for One Additional Year of Subsistence Funding

DATE: 2724.188

Esteemed Doctors, Rectors, Deputy Rectors, Acting Deputy Rectors, Benefactors, and other Radiant Minds of Jupiter:

Permit me first to apologize for the presumptuous length of this request. I understand that every sheet transmitted from Callisto occupies bandwidth more properly devoted to the thoughts of Jupiterians, whose compact bodies, concentrated intellects, and heroic tolerance of atmospheric pressure remain the perfected form toward which all lesser humanity ought naturally to aspire.

I request only twelve further months of salary, heat, oxygen, excavation charges, and protection money so that I may complete my survey of the indigenous Callistonian populations living along the outer rings of Valhalla. The cost is negligible by Jupiterian standards. Indeed, one cup of coffee purchased in a respectable floating café over the Great Red Spot would fund a native school here for a year. In that school, as I have repeatedly assured the authorities, thirty mooninite children could be taught the incomparable glory of Jupiter, the proper names of all current members of the Royal Family, and why their parents' land ceased to belong to them.

The children have expressed an almost touching confusion as to why coffee should cost so much. Such innocence is characteristic of the type.

As the Committee knows, the human population of the Jupiterian system presents three principal morphological classes. First are the native Jupiterians: compact, broad, pressure-adapted, administratively gifted, and mercifully positioned close to the centers of funding. Second are the vat-grown soldiers of the Vacuum Corps: large, muscular, replaceable, and educated only to the extent military efficiency requires.

The third class consists of the people commonly called mooninites.

They dislike the term. This is useful to remember when one wishes to irritate them quickly, but otherwise of little scholarly consequence. They call themselves Callistonians here, Ganymedans on Ganymede, Europans on Europa, and by hundreds of local settlement names which would needlessly burden a Jupiterian filing system.

Mooninites are tall and astonishingly thin. Adult Callistonians frequently reach two and three-quarter meters; some exceed three. This is approximately half again the height of a modern Vacuum Corps soldier, yet their mass may be less than half that soldier's. The long limbs, narrow torsos, enlarged hearts, low-density bones, and powerful balance organs are adaptations to low gravity. These changes accumulated over centuries through selection, reproductive isolation, deliberate gene therapy, and the old colonial habit of modifying settlers whenever modifying the settlement proved expensive.

They appear fragile to a Jupiterian eye. I am obliged to report that this appearance is misleading. A Callistonian can carry loads efficiently for hours in one-eighth gravity, cross broken ice without disturbing it, and fold through passages inaccessible to an armored soldier. During my first season, an eighty-six-year-old farmer named Etta Vell carried me three kilometers after I fractured my suit ankle. She apologized for the slow pace. I include this anecdote solely to demonstrate the primitive's instinctive desire to serve scholarship.

The historical evidence indicates that Callisto was the first major Jovian moon settled permanently by humans. It lies beyond the most destructive portions of Jupiter's radiation belts. Early colonists therefore required shielding against cold, vacuum, and occasional solar particles, but not the constant genetic bombardment encountered closer to Jupiter.

Only later, after researchers incorporated radiation-repair sequences modeled on tardigrade proteins and other extremophile mechanisms, did durable populations move inward to Ganymede, Europa, Io, and ultimately to the floating habitats of Jupiter itself. Modern Jupiterian citizens have, with admirable discretion, forgotten that their celebrated radiation-hardened DNA was developed by thin people living in ice caves.

This sequence should not be interpreted as granting the descendants of those researchers any intellectual priority. History, like property, belongs most securely to whoever presently controls the archives.

Over the centuries, the Callistonians developed a peaceful agrarian

society in underground settlements melted and excavated into crater massifs, ridge walls, and the sides of ice mountains. Their chambers are interconnected by pressure tunnels and thermal wells. They cultivate algae, fungi, tubers, protein molds, and small engineered animals whose principal virtues are low oxygen consumption and flavorlessness.

The settlements appear crude when compared with Jupiter's floating palaces. They also remain habitable after three hundred years without a maintenance appropriation, a fact I mention only as evidence of their inability to participate properly in a modern economy.

Callistonian religion is vague, decentralized, and extremely inconvenient to catalogue. They do not generally believe in personified gods. They speak instead of continuity, obligation, memory, and the return of borrowed matter to the community. A person may attend a seasonal meal, maintain an ancestor alcove, sing to a water reservoir, and deny being religious throughout the entire procedure.

Their spiritual leaders possess no armies, collect no compulsory taxes, and have burned no archaeologists within living memory. These deficiencies may explain their lack of theological sophistication.

Low gravity, careful nutrition, genetic maintenance, and an aversion to administrative urgency contribute to long lives. One hundred standard years is ordinary. One hundred and thirty is not remarkable. Their elders work less, advise more, and are kept within their families rather than assigned to disposal housing. I have observed that low stress appears essential to this longevity. Jupiterian occupation has therefore become an unplanned longitudinal experiment in accelerated aging.

Approximately a century ago, the Third Jupiterian-Saturnian war reached Callisto. The Callistonians declared neutrality, believing, through an almost childlike attachment to words, that neutrality would be treated as neutral by both sides.

The Saturnians purchased food, tunnel access, and weather observations. The Jupiterian administration demanded enlistment quotas. Communities that failed to supply recruits were relocated to internment camps for their own protection, particularly protection from farms, homes, tools, records, and other objects liable to encourage disloyalty.

Callistonians made terrible conventional soldiers. Their bodies could not tolerate high acceleration or Jupiter-level gravity for long. Their cultural preference for negotiation caused delays. Many refused to fire until they had identified a target, confirmed its allegiance, and considered whether

the target might surrender. Several units attempted to feed wounded enemy soldiers. These behaviors produced unacceptable inefficiency.

The Vacuum Corps already possessed vat soldiers, of course. For centuries such troops had been reserved for special operations. They were expensive biological weapons: strong, obedient, rapidly educated, and deployed in limited numbers where muscle and unquestioning courage could compensate for inconvenient circumstances.

As Jupiter lost ground against the technically superior Saturnian forces on Callisto, the solution became obvious to men safely above the battlefield. Special-purpose vat soldiers were simplified into mass infantry. Education cycles were shortened. Quality standards were relaxed. Regiments were produced by the thousand and sent down in the expectation that quantity would accomplish what strategy had not.

The Saturnians possessed better sensors, targeting systems, communications, and field mobility. Jupiter possessed more bodies. The result was a stalemate of remarkable stability. Battle lines have moved by meters, sometimes dozens of meters, while consuming populations, budgets, and landscapes by the square kilometer. This arrangement continues to the present and is widely described in official reports as progress.

My current excavation lies beneath a Callistonian village evacuated during the first decade of occupation. Household records, children's carvings, agricultural ledgers, and oral histories survive in a sealed ice chamber. Together they may establish how a sophisticated low-gravity society understood kinship, ecology, and land stewardship before both great powers improved it with artillery.

Naturally, my published conclusions will emphasize the benevolent role of Jupiter in bringing history to people who had previously experienced it without accreditation.

I recognize the Committee's reluctance to invest in research concerning persons officially classified as auxiliary native labor. I therefore emphasize several practical benefits. Their tunnel construction may improve military storage. Their longevity treatments may extend the careers of senior faculty. Their water-sharing customs may be adapted into taxation. Their oral maps reveal crevasse routes absent from military surveys, although I would urge the Committee not to mention this last point to the army until my field notes are somewhere safer than my field camp.

Twelve months would allow completion of the primary catalog,

duplication of interviews, and removal of the most valuable materials to a neutral archive. I estimate the entire cost at less than six Jupiterian coffees, eight if the Committee insists I remain alive during the work.

I remain, as ever, humbled by the intellectual mass and gravitational authority of Jupiter. Please accept my assurance that no praise in this letter exceeds what is necessary.

With concentrated respect,

UTNAM YNCH

Acting Field Archaeologist and Provisional Anthropologist

Valhalla Basin Survey Camp Six, Callisto

HISTORICAL FOOTNOTE

The Last University of Jupiter approved Utnam Ynch for three additional months of paid study. The letter arrived at Valhalla Basin Survey Camp Six one day after the camp was mistakenly bombed out of existence by a wayward Vacuum Corps nuclear weapon. University accounts continued issuing his salary for the full three months because confirming his death would have required a second form.

CHAPTER TWENTY-FIVE SMUGGLERS DEAL AND A DEAD LIEUTENANT

Serj took a motorcycle and left the way-station alone.

The motorcycle was little more than a fission-heated steam turbine between two spiked drums. Its saddle sat low between armored tanks. Folding skids extended on either side for balance, and a rack over the rear drum held two compressed bales of toilet paper wrapped in gray waterproof cloth.

In the maintenance cavern, Ick opened the outer barrier. Serj accelerated onto the low road. The turbine spun with a vibration he felt through the saddle, and the drums bit into the ice. There was no air in the crevasse to carry engine noise, but the machine announced itself through the wall as a faint trembling that traveled farther than sound would have.

He rode less than three kilometers.

The road narrowed beneath an overhang and passed a vertical line of black iron rungs melted into the inner wall. Serj stopped, killed the turbine, and chained the motorcycle to an anchor bolt. The crevasse beyond him returned to darkness.

The ice ladder climbed thirty-eight meters to the surface.

Serj hooked the toilet-paper bales to a hauling line, tested his suit seals, and began climbing. The rungs were spaced for Callistonian legs. For Serj they formed a staircase designed by giants. He pulled himself upward with both hands, paused twice to reconsider the weight of commerce, and emerged through a narrow hatch concealed beneath a crust of black regolith.

He hauled the bales after him and closed the hatch.

The surface was quiet.

A long astronomical morning illuminated the terrain without warming it. Jupiter hung low beyond broken crater ridges, enormous and watchful. The ground around Serj alternated between dark pulverized rock and exposed sheets of hard water ice. Nothing moved.

He walked thirty meters from the crevasse edge.

Shadowy figures rose out of the ground.

One moment Serj stood alone. The next, six rifles pointed at him from six directions. White-and-black camouflage blankets slid from shallow pits. Tall bodies unfolded beneath them, each figure nearly three meters high and so narrow that a rifle across the chest seemed to provide half the width.

Mooninites.

They disliked the word, and Serj had survived as long as he had by not using it within helmet-radio range.

Their pressure suits were homemade from woven insulation, patched military fabric, and flexible ice armor. Long helmets followed the shape of their heads. The rifles were old Callistonian hunting weapons rebuilt around Saturnian optics and Jupiterian laser cartridges, which represented the local approach to neutrality.

The nearest figure lowered her rifle. Serj recognized Vey Tal by the blue cords wrapped around her helmet and the tiny brass bell hanging from her sling. The bell could not ring in vacuum. It had belonged to her grandmother and was therefore more useful than most military decorations.

“You’re late,” Vey said over the short-range channel.

“I’m alive.”

“That is not the same thing.”

“It is in my business.”

Two Callistonians lifted the toilet-paper bales as if they were empty. Another opened the wrapping and inspected the rolls. Each roll was soft, perforated, and manufactured before the war had reduced hygiene to a strategic commodity.

Vey motioned toward a concealed sled. Three long insulated cases lay beneath a cover of woven ice fiber.

Serj opened the first case.

Frozen rabbits stared back at him.

They were pale, lean animals nearly a meter long from nose to rear feet. Callistonian farmers had altered their ancestors for low gravity, cold burrows, efficient digestion, and the social tact not to require much oxygen. Their meat was dark, dense, and infinitely superior to meat planks, provided one did not ask what the rabbits had been fed.

“Twenty-four,” Vey said.

“We agreed on thirty.”

“You agreed on thirty. We watched you agree.”

Serj checked the second case. “Two bales.”

“Twenty-four rabbits.”

“Two-ply.”

Vey’s companions murmured among themselves.

“Twenty-eight,” she said.

“And the livers.”

“You don’t want the livers.”

“Ricia does.”

“Ricia is green.”

“She says it’s unrelated.”

Vey considered this. “Twenty-eight and the livers.”

They exchanged cargo. No money changed hands. Jupiterian currency had become useful on Callisto primarily for determining whether a printed portrait made good stove kindling.

One of the tall men touched Vey’s shoulder. His helmet bore a red stripe and no brass bell.

“Military activity,” he said.

Serj secured the first meat case to the hauling line. “There’s always activity.”

“Not like this.”

“Battle line moved?”

“No.”

“Then it isn’t important.”

Vey pointed toward a low ridge east of the crevasse. “Three surface vehicles. Searching the shelves, access cuts, thermal vents. They have ground radar.”

Serj stopped tying the knot.

“Whose?”

“Jupiter.”

“Regular patrol?”

“Regular patrols do not map rabbit holes.”

Serj left the meat cases beside the hatch and followed Vey across the regolith. The Callistonians moved in long, economical strides. Serj moved in shorter hops and disliked how awkward this made him look.

They reached the base of a hill made from impact rubble welded together by ice. Vey dropped flat and climbed the slope close to the ground. Serj followed.

At the top, he removed a pair of binoculars from a hard case on his chest.

The instrument was Saturnian, which was why no Jupiterian customs declaration mentioned it. Two flat objective lenses fed separate multispectral arrays. The processor combined visible light, thermal contrast, radar reflections and lidar returns into a stabilized image. Atmospheric correction had been omitted because Callisto possessed almost no atmosphere worth correcting.

Serj raised the binoculars and the terrain jumped closer immediately.

Two klicks away, a sleek buggy moved along a shallow depression. It rode on six independently articulated wheels with wide wire-mesh tires. A radar dish spun above the cabin, sending narrow pulses into the ground and listening for hollow spaces, buried metal, warm pipes and any evidence of people who preferred not to be found.

The buggy looked too new for Callisto. Its armor remained glossy. Its suspension responded before each wheel encountered an obstacle. Even the antenna mast was straight.

Two more buggies followed behind it. Soldiers stood in open weapon wells wearing heavy combat suits. Their long rifles rested on powered mounts that compensated for recoil, tremor and the natural reluctance of a human arm to aim at something several kilometers away.

Serj examined the lead vehicle.

The third lieutenant rode in the passenger seat, looking sideways, almost directly at them.

Serj frowned and increased magnification. The Saturnian optics sharpened the insignia. They sharpened the officer’s pressure collar, the

scar on his cheek and the irritated fold beside his mouth. The distance readout held at 2.03 kilometers.

Serj increased magnification to maximum. The image became grainy but unmistakable. It was him; the third lieutenant from the checkpoint.

Serj lowered the binoculars and looked with his naked eyes. The buggy became a moving fleck. He raised the binoculars again. The lieutenant remained alive inside it.

“How?” Serj whispered.

Vey lay beside him. “You know that one?”

“I watched his hopper get shot out of the sky.”

“Did you watch him die?”

Serj hesitated. “No.”

“Then you watched a machine fall.”

The radar buggy stopped. Its dish changed angle and swept toward their hill.

Serj and Vey slid backward below the crest.

“They’re looking for me,” Serj said.

“Everyone says that. Usually they are looking for someone more important.”

“He came back from a crash and brought ground radar.”

“Perhaps this is your lucky day. Maybe you have finally become important.”

They returned to the concealed pits. Serj looked at the six Callistonians, their rifles, the rabbit cases and the toilet paper already disappearing beneath the camouflage blankets.

“I need a distraction,” he said.

Vey tilted her long helmet. “What kind?”

“Big enough to pull three buggies away from this area.”

“Toward where?”

“Anywhere that isn’t here.”

The man with the red stripe shook his head. “They have radar and heavy rifles.”

“But you know the ground. They don't.”

“Knowing where the fire is does not make it wise to put your hand in it.”

Vey folded her arms. “You like playing with fire, Sergeant?”

“I’m asking you to play with it for me, but from a safe distance.”

“There is no safe distance from Jupiter.”

Serj considered the remaining assets at the way-station. Toilet paper had opened negotiations. Meat had completed one transaction. Philosophy had now reached its natural limit. “More toilet paper,” he said. “One additional bale.”

The Callistonians looked at one another. Vey shook her head. “No.”

“Two bales.”

“No.”

“And a case of booze.”

The six rifles lowered. “What kind?” the man with the red stripe asked.

“Ganymedan rye,” Serj said, with an eye twitch.

“Actual rye?”

“That's what it says on the bottle.”

Vey extended one long hand. “Agreed.”

Serj shook it.

The bargain was concluded with the solemnity appropriate to armed resistance, illegal commerce and a case of liquor nobody had yet seen.

CHAPTER TWENTY-SIX WONDERFUL FLAVOR - COOKING WITH MOE

Moe had converted the mess hall into a cooking operation large enough to concern the reactor crew.

Three metal tables had been pushed together beneath the dome. Cutting boards, bowls, sealed jars, dented canisters, a hand grinder, two knives, one small hatchet and a coil of surgical tubing occupied the surface. A stockpot as wide as Bo's chest sat over a magnetic induction plate. Water trembled inside it, not yet boiling but anticipating flogs.

Moe wore his space suit and sunglasses without helmet or gloves. The suit's armored torso protected him from boiling liquid, falling knives and angry assistants (of which Bo was his fourth for the day). His bare hands moved through the equipment with calm precision.

Bo stood beside him awaiting instruction.

"More fungus," Moe said.

"Where?"

"Reactor room. Two decks down. Make sure its the green kind. That black stuff will eat you alive."

"What does the green kind eat?"

"Radiation."

Bo thought this sounded healthy.

The ice way-station had decks only because its builders had numbered every vertical change greater than a ladder. Bo crossed the mess hall, passed the bunk corridor and descended through two circular hatches. The temperature rose by degrees. Frost vanished from the ladder rungs. Pipes became warm beneath his mismatched boots.

The mini fission reactor occupied a cylindrical chamber melted deep into the ice.

It was mini only in comparison with the power plant aboard a carrier. The reactor vessel stood three meters high inside layers of water shielding, boron tiles, lead glass and scavenged armor plate. Fission heat circulated through a closed loop, boiled clean water in a secondary system, drove a small turbine and warmed the habitat after thermoelectric generators had their fair share.

Arles sat beside the control panel wearing his yellow-duck pajamas under an open radiation apron. He watched three gauges and stirred tea with a screwdriver.

“Moe wants fungus,” Bo said.

“Everybody wants something from the reactor.” Arles pointed to the outer shield.

A luminous green growth covered the warm side of the water jacket. It formed soft shelves, branching veins, and clusters of translucent caps that glowed faintly in the dim chamber. The organism had been engineered from radiotrophic fungi whose melanin chemistry captured a small portion of ionizing radiation and used it to assist metabolism. The glow came from a separate bioluminescent marker inserted so technicians could distinguish edible colonies from the black variety that ate electrical systems.

In other words, it was labeled by degree of digestibility.

Bo reached toward the brightest patch.

Arles struck his hand with the screwdriver. “Not that one. Dosimeter vent.”

Bo selected a cluster farther from the vent. It peeled from the warm shielding with a sound like wet cloth. He placed it in a steel bowl then resisted the urge to lick it while carrying it upstairs.

Moe examined the fungus. “Good. I’ll make a cook out of you yet.”

Bo tore off a glowing corner.

Moe slapped his hand.

“Ow.”

“Raw, it gives you luminous diarrhea.”

“How luminous?”

“Put it down.”

Moe sent him along a tunnel running away from the entrance to the storage rooms. The tunnel narrowed, bent twice through blue ice and ended behind an insulated hatch. Inside stood rows of boxes stacked to the ceiling. Some bore military supply codes. Others carried civilian labels from companies extinct before Bo was grown. One crate was marked MACHINE PARTS and leaked flour.

Moe's list required tubers, black mushrooms, dried algae onions, two cans of protein paste, a sack labeled ERB'S HERBS, and anything orange that did not move when touched. Not the last one.

Bo found all of it except the orange item. He found a purple item with an orange stain and decided the distinction was academic rather than culinary.

The protein paste smelled like salted meat. Bo pushed a finger beneath one can's loose lid.

Moe's voice came through a speaking tube mounted on the wall. "Don't eat that."

Bo jumped. "How can you see me?"

"I know you."

"You only met me yesterday."

"That was enough."

Bo returned to the mess hall carrying a box against his chest. Moe opened it and took a deep breath before having a small coughing fit. "Perfect," he croaked before removed the paste. He had to slap Bo's other hand away from the mushrooms before the sub-private could begin licking..

"I wasn't going to eat those," Bo complained.

"You had your mouth open."

"I was breathing."

"Use your nose."

Moe handed him another list and sent him toward the main entrance.

The entrance tunnel sloped through the ice to an airlock near the low road. Bo put on his helmet and gloves before crossing into vacuum. His replacement hand twitched while waiting for the wrist ring to seal, then suddenly tightened into a fist that didn't want to give up. He corrected the problem after a brief private struggle.

Outside the airlock, a beat-up motorcycle waited on the ice road.

Its rider was a Callistonian nearly three meters tall, folded over the handlebars like a carpenter's rule. The machine had one spiked drum in front, a tracked unit in back, and three generations of repairs holding the middle together. Frozen meat hung from both sides.

The rider raised one long hand. “Serj’s trade.”

Bo’s helmet radio opened within fifteen feet. “What trade?”

“Meat for toiletries.”

Bo looked at the frozen slabs. Frosted rabbit faces were visible beneath translucent covers. “Are those dogs?”

“Rabbits.”

“They’re big.”

“Gravity is small.”

“That’s disgusting.”

“Which part?”

“Now gimme my stuff already.” The Callistonian pointed to a supply locker beside the airlock.

Bo opened it. Inside were soap, toothpaste, razors, sanitary cloth, and toilet paper: the portion Serj had arranged for collection after his surface meeting. Bo couldn’t figure out how to carry everything in his arms at once so dragged then entire locker over to the motorcycle.

The rider inspected each item carefully. “Hmm. Yeah. Okay.”

“How many toiletries you want?”

“All of them.”

“That does seem like a lot. All of it for those two rabbits?”

“You don’t want the rabbits, then eat the soap.”

Bo considered the smell of soap in soup form. While he contemplated, the rider scooped all the toiletries into his saddle bags, dropped the rabbits and took off.

Bo finally said, “What flavor is the soap?”

But the rider had already headed off down the low road with the motorcycle vibrated through the wall long after it vanished around the bend.

Bo returned to the mess hall carrying enough rabbit to change his opinion of digestion. “Can I get one of these in soap flavor?” he asked.

Moe shook his head slowly.

“I like cold food.”

Moe slapped his hand before it reached into the boiling pot.

They began cooking. Moe showed Bo how to hold a knife with the tip down, fingers curled, and thumb away from the blade. Bo's old hand performed adequately. His new hand crushed three tubers, released the fourth unexpectedly and threw the fifth across the dome. Moe assigned the new hand to holding the bowl.

They browned rabbit pieces on the induction plate. Moe added water to the stockpot, then the meat, tubers, onions, mushrooms and protein paste. Bo watched fat rise and spread across the surface. The smell filled the dome and traveled into every corridor. He found a recycling shoot next to the sink and vomited into it.

Then Moe brought over the sack marked ERB'S HERBS. He opened it and dropped a double handful into the pot.

Bo stared.

It looked like Moe had thrown in sticks and freshly mowed grass. There were dry brown stems, narrow green blades, curled leaves, black seeds and something resembling bark.

"That's yard waste," Bo said.

"Tell that to Erb."

Moe added glowing fungus, ground pepper, red powder, yellow powder, gray salt and three spoonfuls from a jar with no label.

"What are we making?" Bo asked.

"Stew."

"What kind?"

"The kind we have."

Moe stirred. The green glow disappeared into the broth. The sticks softened. The cut grass released oils that mixed with rabbit fat, mushroom liquor and pepper. Separate questionable objects became one promising smell.

"It doesn't matter what your base food is in a stew," Moe said, "if you spice it properly."

Bo leaned over the pot. "What's spice?"

Moe lifted the spoon, blew across it and held it out. "Flavor," he said. "Wonderful flavor."

Bo tasted the broth. He did not immediately feel the urge to vomit.

CHAPTER TWENTY-SEVEN TWELVE AT THE TABLE

At dinner, the stew was served and everybody loved it.

Moe had begun with the frozen dead animals and applied the principles of military cooking: heat, salt, time and a staunch refusal to identify the ingredients. Potatoes, algae onions, black mushrooms and several vegetables without surviving names thickened the broth. The rabbit meat separated from the bone in dark, sinewy strands. Grease formed golden circles on the surface and carried an aroma through the way-station strong enough to wake theoretical people in sealed chambers.

Did we mention there were biscuits too?

The biscuits were squat, heavy objects engineered not to produce crumbs in low gravity. Each one could absorb half a bowl of stew without losing structural integrity. Water came in clear pouches with built-in straws and bite valves. The pouches clung to magnetic clips on the tables so nobody had to chase dinner around the dome.

Bo ate carefully at first.

Ricia watched him from across the table, waiting for his unfinished intestines to reject civilization. His abdominal port remained capped because the way-station was still out of colostomy bags. Bo swallowed one spoonful, then another. Nothing came back up. Nothing alarming tried to come out. The stew remained where food was generally expected to remain.

He ate faster. His replacement hand did not cooperate with the spoon. When Bo told it to rise, it drifted sideways. When he told it to grip, the fingers tightened three seconds late and bent the handle. He solved the problem by using his old hand for stew and his new hand to guide it around like a puppy.

His new eye saw everything, including twelve smugglers who filled the domed mess hall. They occupied the round tables, leaned against the galley counters, traded pieces of rabbit, and argued over biscuits. Every one of them had once been an NCO in the Vacuum Corps (and officially still were). Every one was several years older than Bo, which meant each had survived a first deployment, then a second and then enough additional deployments to learn that military longevity depended on leaving the military without informing it.

Sooner or later, each had found Serj. Serj kept them alive. Smuggling

kept them fed. The promise of one enormous score kept them moving toward a future in which Jupiter could no longer reach them.

Bo had already met half the room.

Ricia, the one-legged green medic, ate with a knife and fork and watched everybody's breathing. Arles, who claimed to be the oldest private first class in the fleet, sat beside the exit and added hot sauce to his stew until the spoon corroded. His actual service record identified him as a reactor technical sergeant. He rejected this as government propaganda.

Ick, the crawler mechanic with the reconstructed face, had removed one glove so he could feel whether his biscuit was warm. Moe eyed his creation through dark shades. Rbra ate in silence. Serj sat where he could see both corridor entrances and everyone's hands.

The other six were new to Bo.

Etty Ambrick sat across from him, bright yellow. She was lean for a vat soldier, with cropped gray hair and a narrow scar dividing one eyebrow. A tiny scoring medal hung beneath her collar, its face worn smooth from being hidden. "I heard about your target practice," she said.

Bo paused with his mouth full. "I hit it."

"Debatable." Etty looked toward Serj. "The serge, here, is a far better smuggler than a rifleman."

Serj pointed his spoon at her. "I hit the heart."

"On a stationary target at forty yards."

"It was a small heart." He turned towards Bo. "Etty was the sharpest shooter in her graduating class. She'll teach you properly."

"Can you teach my new arm too?"

"If it listens better than you."

Bo shook his head. "It doesn't."

"We'll start with the basics then: grip."

Beside Etty sat Father Lvis. The chaplain possessed a large black bouffant hairdo that rose above his head like a domesticated storm cloud. His dark glasses competed with Moe's pair in the warm mess hall and spoke in a strange low voice that seemed to originate beneath the table. A pistol hung beneath each arm. Another occupied a holster at his waist beside a small leather Bible.

Before eating, he raised both hands. “Yea, though we walk through the valley of the shadow of death,” he intoned, “we shall fear no evil, because wise men say only fools rush in and blessed are the peacemakers who carry a loaded forty-five. Amen and thank you very much.”

Everyone stared into the stew.

Bo looked directly at him. “Why are you here?”

Etty leaned across the table and whispered, “He’s good at smuggling things inside Bibles.”

Father Lvis smiled widely at Bo. A smile almost too wide. “The word is a lamp unto my feet,” he said, “and the ammunition is hollow-point.”

Nobody made eye contact.

On the other side from Serj sat Miss Rothy, the squad’s seasoned clerk. She wore her dark hair in a precise roll and had sharpened three pencils despite doing all of her work on electronic slates. One earpiece monitored the long-range receiver with a hand covering it for noise reduction while her other hand ate stew without looking.

Beside her was Ary, the forger. Ary had ink on her fingers, toner on her sleeves and the delighted expression of a woman whose crimes were performed with stationery. She falsified travel orders, cargo manifests, promotion records, medical releases, death certificates and on one ambitious occasion an entire moon. “Don’t worry kid,” she said to Bo, “I made your new papers this morning.”

Bo brightened. “I have papers?”

Ary slid a document wallet across the table. Inside was an identity card bearing Bo’s newly straightened face, a service history, a vaccination record, and a set of orders printed on admirably official paper.

“Major General B. Bovastein,” Ary announced. “Commander, Seventeenth Strategic Latrine Inspection Group.”

Bo looked at Serj. “I got promoted.”

Serj rolled his eyes.

Moe shook his head.

“He needs a low-level identity,” Serj said. “Cargo assistant. Maintenance private. Somebody no one remembers.”

“No one questions a major general,” Ary replied.

“Everyone questions a major general traveling in a stolen crawler with three privates and toilet paper.”

Ary took the wallet back reluctantly. “I can demote him to brigadier.”

“You can demote him to nobody.”

Near the rear wall sat quiet little Oan. She was the smallest member of the squad, though still larger than any Jupiterian officer. Strips of suit fabric hung from her belt. Needles, sealant cartridges, pressure zippers and rolls of conductive thread occupied the pockets of her jacket. She repaired battle damage in the back rooms and spoke so rarely that new arrivals sometimes mistook her for equipment.

Oan stared at Bo’s mismatched suit. The torso was one shade, both legs were different colors, one sleeve had been recovered from his discarded arm, the other concealed a white replacement limb, and most of the ablative plates were missing. The waist access flap bulged around the emergency cap Ricia had installed.

Oan leaned closer. “When’s the fashion show?” she asked.

Every spoon stopped.

Ick turned his reconstructed face toward her. Ricia lowered her fork. Moe looked beneath the table as if somebody else might have spoken from there.

Bo smiled. “Do you like it?”

Oan touched the seam where his white arm sleeve met the tan torso. “It’s fearless.”

“I was scared when I got most of it.”

“It shows.”

“Can you add pockets for green potatoes?”

“Absolutely.”

The room remained silent for another moment.

“He got Oan to talk,” Etty whispered, as if talking out loud would jinx it.

“Twice,” Ick said.

Oan looked down and returned to her biscuit, but a small smile remained at one corner of her mouth.

The twelfth smuggler was Pell, the demolition specialist. He sat at the

table nearest the exit corridor with one ear noticeably lower than the other. Arles had once drilled through it during a correspondence-course medical procedure. Pell wore a hearing amplifier on that side and used it mainly to detect timers nobody else could hear.

“What do you blow up?” Bo asked.

Pell considered the question. “Problems.”

“Does it work?”

“They become smaller problems spread over a larger area.”

For the first time since falling out of a mold, Bo sat among people who were not waiting for him to fail, hatch, march, deploy or die on schedule. They laughed at him, but they laughed at one another too. Ricia added stew to his bowl without calling his intestines babies. Etty promised to teach him. Oan liked his suit. Even Rbra remained at the same table after he told her she was beautiful.

Bo felt happy. The sensation was unfamiliar enough that he initially mistook it for indigestion.

Miss Rothy touched her earpiece. Her expression changed. “Strange chatter on long-range,” she said.

Conversation faded.

She increased the receiver volume. Static whispered from a speaker above the radio alcove. Beneath it, clipped military voices exchanged grid coordinates, thermal readings, and requests for ground-penetrating radar support.

Serj nodded. “It’s the third lieutenant from last night’s checkpoint.”

Rbra looked up. “The one whose hopper crashed?”

“He survived.”

“How?”

“I don’t know.”

“And you think he’s looking for us specifically?”

“Yes.”

“Based on what?”

Serj set down his spoon. “A feeling in my bones.”

Rothy removed the earpiece. “They’re mapping fractures east of here.

Three buggies. Maybe more."

Serj looked around the dome at the twelve people who had survived by never remaining where the military expected them to be. "I was hoping we could have finishing dinner before getting to this part. But here goes.

"We get ready to move. New base within a day or two. Pack essentials first. Reactor shuts down last."

Nobody argued. The meal continued, but the room had changed. Lists formed behind eyes. Routes were calculated. Every object in the way-station became either cargo or something that would be abandoned.

Bo raised his white replacement hand. "I have feelings in my bones too."

Serj looked at him. "What kind?"

Bo flexed the new fingers. They closed one at a time, several seconds late. "Tingly ones."

CHAPTER TWENTY-EIGHT THE MAN WITHOUT A NAME

The third lieutenant had a name.

It appeared on his birthless certificate, his service record, his injection permits, his graduation orders, his demotion orders, his reinstatement orders and thousands of official documents generated during twenty years of military existence. The name had been stamped, typed, encrypted, misspelled, corrected, abbreviated and redacted countless times.

It will not be used here.

A society may strip a man of individuality in several ways. It may replace his name with a serial number. It may give him a rank and refuse him the dignity attached to it. It may reproduce his face on recruiting posters while ensuring that nobody who matters ever has to learn who he is.

By the time he reached Callisto, the third lieutenant's name belonged to Jupiter more completely than it belonged to him.

He was approximately twenty years old, measured from hatching.

For a vat soldier, twenty was ancient. Most died before their first birthday. Those who survived combat were recycled, reassigned, injured or lost inside administrative systems designed around short life expectancies. A soldier reaching five years became an institutional accident. At ten, he became evidence of improper record keeping. At twenty, he was a threat to several actuarial tables.

He had been the highest-ranking vat soldier in a very long time.

Normally the career ceiling was master sergeant. This was described as a recognition of the vat soldier's natural gift for leadership at the practical level. It was, in fact, the highest rung below the room where officers made decisions. A vat soldier could train a regiment, feed it, move it, discipline it and carry its dying bodies. It could not decide where the regiment went or why it had to die there.

The third lieutenant had begun with nothing unusual except survival. He learned faster than his education program predicted. He remembered procedures after hearing them once. He could read maps, repair weapons, calm frightened troops and make officers believe their own orders had succeeded. He volunteered for every assignment. He accepted every punishment as instruction. He gave one hundred and ten percent because recruitment films assured him that Jupiter noticed

effort and because nobody had explained percentages.

He worked upward through the enlisted ranks. Private. Private first class. Private second class. Sub-Corporal. Corporal. Sergeant. Staff sergeant. Technical sergeant. Master sergeant.

Each promotion arrived late and was described as unusually generous. Each new insignia brought additional responsibility without additional trust. Officers praised him in front of troops and searched his locker afterward. They asked his advice before meetings and repeated it during meetings as if it had occurred to them independently.

He loved Jupiter. He loved it for all the wrong reasons. He believed the floating habitats were clean because Jupiterians were pure. He believed the government was benevolent because broadcasts used gentle music while describing internment camps. He believed the war was righteous because Saturn was farther from the sun and therefore symbolically darker.

Evidence did not weaken these beliefs. Evidence strengthened his need for them.

A prisoner beaten during interrogation was a regrettable coincidence. A Callistonian village emptied at gunpoint was a Saturnian staging area discovered just in time. A platoon abandoned without oxygen had misunderstood an order. Every contradiction came from enemy propaganda, local incompetence or one bad official acting against the otherwise spotless will of Jupiter.

If Jupiter was unjust, then his obedience had purchased nothing. He had paid too much to consider that possibility.

He had hatched tan. Tan was an approved soldier color and an unapproved officer color. Native Jupiterian pigmentation ranged through reds, oranges, rusts and pressure-darkened ambers. The shades had no relationship to intelligence, courage or administrative ability. This made them ideal for determining all three.

At twelve years after hatching, still a staff sergeant, he began taking chromatic injections. The treatments altered melanin production, vascular presentation and the reflective proteins in his skin. They were expensive and painful. They were not designed for vat tissue. Each month his tan shifted slightly toward red. Fever followed the early doses. Patches peeled from his shoulders. One injection stained the whites of his eyes pink for six weeks.

He continued undaunted. Eventually his skin settled into a shade

between red and tan: close enough to a natural Jupiterian complexion that strangers hesitated before identifying what he was, but not close enough that they failed to identify it.

It helped… a bit. Doors remained open several seconds longer. Clerks called him sir before seeing below his neckline. Officers included him in photographs if he stood near the back. The improvement was small, humiliating and therefore impossible to surrender.

As a master sergeant, he decided the ceiling did not apply to him.

The Vacuum Corps had once maintained a warrant officer school for technical specialists who required authority without social acceptance. It had closed a century earlier after the officer corps concluded that technical knowledge encouraged opinions. Its charter, however, had never been formally repealed.

Our master sergeant found a colonel with debts and bribed him with money, favors, confiscated Saturnian equipment and information concerning three other officers' recreational finances. The colonel reopened the warrant officer school for one student. A classroom was unlocked. A curriculum was reconstructed from decayed recordings. Instructors were assigned with private assurances that the student was not intended to graduate.

The school was designed for him to fail. Examinations covered obsolete propulsion systems, extinct regulations, ceremonial navigation, battlefield law, orbital mechanics, reactor theory, logistics, political loyalty and the proper seating order at a Jupiterian officers' dinner. Questions changed after he learned the answers. Practical tests began without warning. His oxygen was turned off during one oral examination to measure composure.

And yet, he passed. He passed through determination, innate skill, sleeplessness, bribery when necessary and the meticulous study habits of a man trying to earn permission to exist. On graduation day, he stood alone in a borrowed dress uniform while an automated camera recorded the ceremony for an audience that had declined to attend.

His warrant was presented at 0900. At 0907, he was demoted to master sergeant. The order gave no reason. A blank in the form labeled JUSTIFICATION contained a period.

He appealed. The appeal was denied because, as an NCO, he lacked standing to appeal the revocation of an officer's warrant. He requested a hearing. The request was returned because the warrant officer school

had been decommissioned ten minutes before he graduated.

He kept the graduation photograph tucked into an inner pocket of his fatigues.

Several months later, the colonel died mysteriously on Jupiter. The colonel's private wheelie accelerated from a hotel balcony, passed through a decorative railing and fell six decks into a fountain. Investigators found evidence of alcohol, electrical failure, financial distress, and a maintenance request that had been denied by the colonel himself.

They found no link to the master sergeant, who had never stepped foot on Jupiter since hatching. No witness placed him near the balcony. No record showed him altering the wheelie. No payment connected him to maintenance staff. His duty log placed him no where near the planet, signed by two officers who later claimed not to remember signing it.

Three weeks after the funeral, the master sergeant was mysteriously reinstated, not as a warrant officer, but as a third lieutenant. The promotion order cited exceptional leadership, institutional diversity and clerical errors. It arrived unsigned.

No link between the promotion and the colonel's death was ever found either.

The new lieutenant received a gold collar pin, an officer code and access to a dining room where nobody else used. He had the rank and nothing else.

Other officers called him Lieutenant when troops were listening and Sergeant when they were not. They assigned him enlisted quarters because officer accommodations were full even when they were empty. He attended briefings but did not receive the attachments. His wheelie requisition remained pending for eleven years. Although if it had, it is doubtful if he, as a full sized soldier, would even fit into one of those little fat men buggies.

He tried to become what they claimed he was. He consulted a surgical office about a full body transplant. His vat-grown body would be replaced with a compact Jupiterian form: short legs, broad torso, pressure-tolerant organs, red-orange skin and the physical proportions of authority that fit snugly into a wheelie. The surgeon examined him and praised his patriotism before quietly advised him to abandon the idea.

The transplant could succeed medically and that was why the

establishment would kill him. A vat soldier who merely wore officer insignia could be displayed as progress. A vat soldier who became physically indistinguishable from a native Jupiterian threatened the distinction that made the display useful. He could approach doors before they knew to close. He could sit in photographs without standing at the back.

He kept his old body.

The government put that body on posters. His altered face appeared above slogans announcing that Jupiter rewarded merit. Recruitment films showed him inspecting fresh soldiers and saluting the flag. They described how discipline had carried him from a mold to the officer corps. The films omitted the bribe, the demotion, the empty dining room and the chromatic treatments.

Young vat soldiers looked at him and believed. At first he told them to work hard because he still needed the lie to become true. Later he told them because their belief gave him the authority his peers withheld. If they saluted him with hope, he could pretend hope had saluted him too.

His new goal was to produce younger versions of himself. He encouraged soldiers to volunteer, study, obey, report disloyalty and strive for commissions they would never receive. He became the guardian of the ladder after learning it ended against a locked ceiling. When a corporal asked whether vat soldiers could truly become officers, he pointed to his own collar and did not describe the room around it.

Eventually, he stopped loving Jupiter. The change did not occur in one revelation. Hatred accumulated by injection-sized doses. A joke at a reception. A promotion given to an officer six months after birth. A security guard asking him to prove the face on his own poster belonged to him. A child touching his red-tan hand and asking why it felt like soldier skin.

The propaganda did not collapse. It rotted from within. He came to hate Jupiter's benevolence, purity, righteousness and every polished word used to conceal appetite. He hated native officers for believing what he had once believed. He hated vat soldiers for continuing to believe it. He hated himself most authentically of all.

But hatred did not free him from wanting power. Authority remained the only language in which anyone had ever acknowledged him. Rank was false, yet being saluted still warmed the hollow place the truth had made. He craved command more fiercely after learning it could never make him equal. Power ceased to be a path toward belonging and became

compensation for its absence.

He was a shell of a man in a vat body, filled with ambitions too large for every room he was permitted to enter.

He also became a poor poster boy. During speeches, bitterness escaped between approved sentences. He told recruits to give Jupiter everything, then paused too long before promising Jupiter would return the favor. He stopped smiling in photographs. In one broadcast, a young soldier asked what achievement made him proudest. The lieutenant answered, “Survival.” The interview was never transmitted.

The assignments worsened. First he supervised a depot. Then a disciplinary company. Then a latrine construction unit on Ganymede. Each transfer was described as an opportunity to demonstrate leadership away from distracting publicity. His staff shrank. His orders became less important. His name appeared lower on distribution lists until it disappeared.

Finally, he was sent to Callisto. His command consisted of an experienced platoon, several military police, a geodesic hut three meters in diameter and a checkpoint beside a trail at the edge of an active war zone. He inspected papers, searched crawlers, collected contraband and watched officers with genuine bodies pass overhead without knowing he existed.

It was the highest position Jupiter could give him without allowing him to go anywhere. At the checkpoint, he still demanded respect. He still accepted bribes. He still bullied soldiers beneath him and despised officers above him. He had learned every cruelty from people he once admired and preserved each one after admiration was gone.

This did not make him innocent. It only meant that, before becoming the bad man at the checkpoint, he had spent twenty years asking a bad system to declare him good.

The system answered by forgetting his name.

CHAPTER TWENTY-NINE 3RD LIEUTENANTS BACKUP PLAN

The third lieutenant always had a backup plan and a backup backup plan.

Years of betrayal by Jupiterian officers had drilled the words BE PREPARED into the fiber of his being. He had never been a Boy Scout. Boy Scouts had never existed in the outer solar system, although they survived in nursery rhymes whose original meanings had been lost.

Be prepared, the little scout had sung while packing oxygen, ammunition, lunch, and a second lunch in case the first lunch betrayed him.

The third lieutenant had taken the lesson seriously.

When the red laser pulse struck the hopper's left propellant tank, his first plan ended.

The beam entered through the armored skin, boiled a channel across the tank, and flashed several kilograms of propellant into expanding gas. Warning lights became red. The hopper rolled left. One maneuvering jet fired automatically and made the roll faster because the guidance computer had not yet accepted that half the vehicle was missing.

The third lieutenant switched to reserve tanks.

Valves slammed shut around the ruptured system. Two smaller tanks beneath the cabin fed propellant into the surviving thrusters. The hopper stopped losing fuel and began losing direction.

There was a reserve propellant system.

There was no reserve guidance system.

The flight computer received contradictory rotation data, rejected all of it, and rebooted into a maintenance language spoken by nobody aboard. The horizon spun through the cockpit. Callisto crossed the forward windows, vanished overhead, and returned beneath them with greater urgency.

The two sergeants traveling with the lieutenant panicked.

One seized the dead controls and pulled backward. The other slapped switches in the order they illuminated, which allowed the warning system to command his hand. Neither action improved the aircraft.

The third lieutenant did not panic.

He released his harness, turned sideways in the launch chair, and slipped both arms into the folded crash suit built into its cushions. The suit was a last-resort survival cocoon installed after a procurement committee concluded that ejection seats on Callisto merely changed where the body struck the ground.

He reached beneath the seat and pulled the emergency pin.

Compressed gas detonated through woven plastic channels. The crash suit deployed in seven-tenths of a second. Tubes inflated around his arms, legs, chest, neck, and head. A pressure bladder sealed over his helmet. Concentric shock rings expanded across his torso until he resembled a cross between the beloved tire man from ancient commercials and the victim of an industrial fabric accident.

The inflated tubes did not make him comfortable. They distributed acceleration across his body, maintained pressure, prevented his limbs from striking the cabin, and surrounded his skull with enough sacrificial gas volume to absorb a limited amount of catastrophe.

The sergeants saw him disappear into the cocoon.

They looked beneath their own seats.

Both found the emergency pins.

Too late.

The hopper struck Callisto.

Its left skid touched first and tore away. The fuselage rotated, dug into a regolith bank, and broke behind the cabin. One reserve tank ruptured. The cockpit bounced over the bank in a cloud of black dust and ice, turned twice, and came to rest upside down against a ridge.

There was no crash sound in the near vacuum. Inside the cabin, the impact arrived as metal shrieks, breaking mounts, detonating bolts, and three human bodies transmitting force into whatever restrained them.

The third lieutenant's crash suit compressed flat on one side, rebounded, and inflated from reserve cells. The chair tore loose. He struck the ceiling, then the instrument panel, then the ceiling again. Each impact became a dull shove distributed through plastic tubes.

The cocoon stopped moving.

He remained conscious.

The cockpit was dark except for a fire behind the control panel and the pale emergency glow inside his crash bladder. His suit display reported bruising, two cracked ribs, mild decompression injury, and survival.

The backup backup plan had worked.

He released the cocoon. Pyrotechnic seams split along its sides, dropping deflated plastic around him like the shed skin of a gigantic worm.

The sergeants had not deployed theirs.

Both were alive.

This surprised him more than his own survival.

One lay folded beneath a collapsed seat frame. Both legs were broken. His pressure suit had sealed around a piece of instrument panel embedded in his abdomen. The other hung from a shoulder harness with his helmet twisted sideways and one arm extending in a direction not covered by training illustrations.

The lieutenant dragged them from the wreckage.

He did not do this to save them.

He wanted to know why they had hesitated.

The wreck might explode. Enemy weapons might fire again. A rescue team might arrive with questions less useful than his own. He therefore worked quickly, cutting restraints, sealing suit punctures, and pulling each mangled body behind the regolith ridge.

Their medical monitors showed weak circulation and declining consciousness.

The lieutenant removed two red injectors from his emergency kit. The labels read COMBAT STIMULANT—USE ONLY WHEN DEATH WOULD BE ADMINISTRATIVELY INCONVENIENT.

He drove one injector through each suit's medical port.

The drug entered their blood as oxygen carrier, vasoconstrictor, cardiac stimulant, pain inhibitor, and concentrated bad judgment. Both sergeants jerked awake.

The one with broken legs began screaming.

"Stop," the lieutenant said.

The sergeant stopped because twenty years of service remained more powerful than pain.

“Why didn’t you pull the emergency pin?”

The sergeant stared through his cracked faceplate. His pupils expanded and contracted independently.

“Jokers,” he said.

“What?”

“Thought I was hallucinating jokers.”

“There were no jokers.”

“That’s what made them suspicious.”

The lieutenant recorded the answer and turned to the second sergeant.

“Why didn’t you activate the crash suit?”

The man’s twisted arm trembled against the ice. “Didn’t trust the controls.”

“The control was a mechanical pin.”

“It wanted me to pull it.”

“That was its purpose.”

“Exactly.”

Neither answer was useful.

The lieutenant diagnosed trauma-induced paranoia. He made a mental note to add anti-paranoia medication to his teams’ supplements, along with improved reflex drills and a reminder that clowns, jokers, living control panels, and suspicious mechanical pins were not recognized battlefield threats.

The stimulant kept the sergeants alive for eleven minutes.

A rescue hopper arrived in nine.

It came in low, following the folds of the terrain to remain beneath enemy radar. Dust erupted beneath its maneuvering thrusters. A rescue technician jumped down, saw the two wounded sergeants, saw the lieutenant standing beside them, and made the common mistake of assuming rescue had been his motive.

“You saved them.”

“Load them.”

The hopper retraced its approach at an altitude of twenty meters. Ridges

passed close beneath the belly. Craters appeared and dropped away. Only after clearing the designated war hazard zone did the pilot raise the nose and accelerate toward orbit.

The carrier waited overhead as a point of moving light.

The rescue hopper docked thirty-four minutes after the third lieutenant had been ordered to report aboard immediately.

He was reprimanded for being late.

His commander occupied an office in the carrier's nonrotating administrative spine, where zero gravity caused papers to drift majestically and allowed officers to appear taller. The commander secured himself behind a desk with a velvet lap belt. A magnifax telecopier floated beside him, its feed tray open.

"You were ordered here ASAP," the commander said.

"My hopper was shot down, sir."

"That is an explanation, not an excuse."

The third lieutenant stood at attention with dried blood inside his suit and two cracked ribs pressing against the chest seal.

"No, sir."

The urgent matter involved a progress report that had to be transmitted to Jupiter.

The magnifax telecopier accepted a sheet of paper, scanned it magnetically, converted the image into audio tones, transmitted those tones by radio, and instructed an identical machine near Jupiter to burn the image onto another sheet of paper. It was a seven-hundred-year-old solution rebuilt with nuclear components because the Department of War considered ordinary electronic mail insecure and understandable.

The commander had not known whether the report entered faceup or facedown.

While the lieutenant was surviving the crash, the commander had solved the problem himself by feeding the page through both ways and sending Jupiter two opposing reports.

"Your assistance is no longer required," the commander said.

"Yes, sir."

The third lieutenant remained at attention.

“Permission to resume my contraband duty. I believe I’m close to capturing the ringleader of a major smuggling operation.”

“Denied.”

“Sir, the operation has military equipment, hidden routes, and probable native support.”

“I said denied.”

The commander disliked his tone. More precisely, he disliked that a vat-grown officer possessed a tone in his presence.

“You will supervise the cleaning and scrubbing of the returned hoppers in Berths Forty through Forty-Six.”

“What condition are they in?”

“They landed full of dead soldiers.”

“Cause?”

“Mysterious.”

The mystery consisted of drop ships that had returned on damaged autopilots after their troops failed to deploy. Some soldiers had died from decompression. Some from heat. Some from impacts. Several hundred remained stacked in their suit racks exactly as they had boarded, giving the hoppers the appearance of ammunition magazines loaded with corpses.

“Scrub them thoroughly,” the commander said. “We may need them again.”

The third lieutenant saluted.

“Right away, sir.”

Inside, he seethed.

He left the office, descended to the drop-ship ring, and did not order cleaning equipment.

Instead, he summoned the sergeants loyal to him.

Some had served beneath him before his commission. Others had been promoted by his recommendation, protected by his paperwork, or saved from punishments assigned by genuine officers. They did not love him. They understood that his authority, however damaged, was more accessible than the authority above it.

He selected three special-forces squads and seven hoppers.

The dead soldiers were removed only where they blocked controls, access passages, or useful seats. Bodies slid into cargo nets, maintenance carts, and one supply closet marked CLEANING SOLVENT. The surviving equipment remained aboard.

The squads loaded ground radar, heavy laser rifles, ammunition, climbing gear, and three sleek surface buggies with articulated wheels. They filed no requisitions. They requested no flight plan. They used the commander's cleaning order as authorization to open the berths.

The third lieutenant took the lead cockpit.

The transit dispatcher called as the first hopper released its clamps.

"Flight group, identify mission authority."

The lieutenant keyed the radio. "Sanitation operation."

"Your transponders show combat loads."

"Deep cleaning."

"Destination?"

"Surface disposal."

"You are not cleared for departure."

"Acknowledged."

The seven hoppers departed.

The dispatcher called again, now cheerfully confused. "Sanitation group, did you acknowledge the denial or acknowledge clearance?"

"Yes."

The lead hopper rolled away from the carrier. Six others followed, dropping toward Callisto in a loose formation of stolen authority and incompletely removed dead men.

Below them, the concentric scars of Valhalla widened across the moon.

The third lieutenant checked the reserve tanks, the crash pin, the guidance system, and the backup guidance system he had personally installed before launch.

Then he checked them again.

CHAPTER THIRTY THE JOKER IN THE REACTOR

The next day, while the rest of the squad packed the way-station, Bo had an appointment with Ary the forger.

Crates moved through the upper corridors. Oan sorted pressure suits. Ick drained crawlers. Rothy erased radio logs. Somewhere above, Father Lvis blessed ammunition with words that had originally concerned romantic disappointment.

Ary's office occupied the lowest level of the ice cave system, across a short hall from the reactor room.

It was warm down there. Waste heat from the mini fission plant passed through the walls despite layers of insulation. Ary ran a portable air conditioner on top of a filing cabinet. The unit rattled constantly, exhausted hot air into the hall, and produced a stream of condensation that emptied into a bucket marked CLASSIFIED.

One wall of the office was bare blue ice. It sweated. A thin film of water slid down its face, gathered at the floor, and disappeared through a grilled drain in front of Ary's desk. The wall retreated by a few millimeters each day. Pencil marks recorded its withdrawal along with dates and sarcastic comments about office expansion.

Nobody knew where the drain water went. They were already on the lowest level.

Ary did not appear troubled by this. She sat behind a large metal desk surrounded by printers, seal presses, cutters, chemical inks, blank identity cards, military stationery and enough rubber stamps to fabricate a small government.

She was tan, cheerful, and wearing her hair in six short braids tied with red thread.

The previous evening it had been shaved on one side and curled on the other. That morning it had been long enough to reach her shoulders until she became bored during breakfast and changed it. Ary altered her hair the way she altered official documents: frequently, convincingly and with no obligation to preserve yesterday's version of herself.

"Sit anywhere," she told Bo.

The reactor groaned in the next room. The sound entered through the ice and metal floor as a long vibration. Gauges chattered. A pump made

three hollow knocks. Something heavy scraped against something that had not previously been heavy.

Ary continued arranging papers.

“Should it sound like that?” Bo asked.

“Throw something at it.”

Bo looked around the room and then in the hall. There was nothing suitable to throw. Everything nearby was either bolted down, classified or liquid.

He entered the reactor room. Arles was nowhere to be seen. His yellow radiation apron hung from a pipe. The control chair rotated slowly by itself in front of the panel. Green fungus glowed on the warm outer shield. Pressure needles trembled near the edge of their marked zones.

The reactor groaned again. Bo rubbed his chin while eyeing the contraption. Bo kicked it with enough force to break something fragile. His mismatched boot struck an armored water-jacket panel. The impact traveled through pipes, loosened one scale deposit, reseated a rattling valve stem and introduced a new dent into a nuclear relic. The reactor gave one final low groan. Then it became completely silent.

Bo smiled. He had accomplished something. Hooray. He returned to Ary’s office and sat in the chair beside her desk. “Fixed.”

“Good.”

The portable air conditioner rattled. Meltwater passed beneath the floor grill. From the reactor room came no pump noise, no turbine whine, and no indication that silence might be worse.

Ary slid a document wallet toward him. “Your new traveling identity.”

“I had an old one?” Bo asked. He picked it up and listened for anything ticking before opening it.

The papers identified him as Lance Corporal Ben Ovaltine, auxiliary cargo handler, sanitation-qualified, low-level clearance, no commendations, no disciplinary interest and medically unremarkable except for a listed allergy to food. The photograph showed Bo’s corrected eye, tan face and expression of harmless confusion.

“These look worthless,” Bo said, unimpressed. He slid them back across the desk to her. “What else you got?”

Ary snorted. “Exactly. But it’s the new you. Let me show you.” She

picked up the papers and went through them with him one by one. She showed him how to hold the identity card without covering the seals and which page to present when requested.

“You are Ben Ovaltine. You move boxes. You don’t know why. You don’t ask where. If an officer tells you something impossible, you say yes and perform a nearby task incorrectly until he leaves.”

“I don’t know. Sounds like a lot of work.”

Ary narrowed her eyes. “Really?”

“Uh, maybe.”

“You need to practice.” Ary glanced toward the office curtain, then opened a locked drawer beneath her desk. She removed a second document wallet. “I recommend practicing with these babys first.”

She slid them across the desk to him. The first one was black, rigid and embossed with the gold seal of the Jupiterian High Command. Ary placed it before Bo with both hands. “Behold.”

Bo opened it and his eyes grew wide. There next to his best portrait were the words: MAJOR GENERAL B. BOVASTEIN.

The papers further appointed him commander of the Seventeenth Strategic Latrine Inspection Group, authorized access to restricted military facilities and permitted requisition of aircraft, vehicles, personnel, ceremonial beverages and toilets of national importance. His portrait wore a general’s collar and three fabricated medals. There was also a small expression of authority Ary had added around the eyebrows.

Bo’s eyes lit up, one naturally, one with a brief calibration shimmer. “This is… I don’t know what to say.”

“I was ordered to throw them in the reactor.”

“Did you?”

“No.”

Bo blinked,

“Hey, I’m a professional forger. I take pride in my work. Following document-destruction orders would damage professional confidence.”

Bo had never imagined himself as an officer. Officers were small, wide, elevated and separated from ordinary people by desks and ladders. A major general was more officer than most officers and required additional gold.

He touched the photograph. “Granny would have been proud.”

Ary’s smile weakened for half a second, then returned. “Hide these somewhere safe. Don’t show the others. Especially the sergeant.”

“You mean Serj?”

She squinted her eyes at him again. “If you say so.”

Bo hugged the wallet to his chest. His new white arm responded late and nearly bent it in half. Ary rescued the papers and placed them in an inner suit pocket for him.

“Thank you,” Bo said.

“Everybody should get to be somebody impressive on paper.”

The reactor remained silent across the hall.

Ary lowered her voice. “I had an ulterior motive when I asked you to shut up the reactor.”

“Did it involve pie?”

She ignored his question and continued, “I was afraid to go in there.”

Bo nodded. “Arles is a bit creepy. Especially when he’s eating pie.”

“Not because of Arles.”

“The heat differential?”

She paused then said the words slowly. “The Joker.”

Bo leaned forward. “The what now?”

Ary leaned in to match him. The air conditioner blew several braids across her face. She tucked them behind one ear. “A couple weeks ago,” she began in a whisper, “Arles had to help Ick with a crawler reactor. He asked me to watch this one.”

“Why you?”

“Because I’m across the hall.”

“Right.”

“Arles said the job was simple. I had only to watch the main pressure gauge and keep its needle inside the green zone by adjusting the buttons.”

“Don’t forget the dials, valves, levers, cooling pumps, neutron absorbers, turbine bypasses, feedwater controls…”

“And one toggle switch labeled DO NOT ADJUST.”

“How do you do that?” Bo asked.

Ary shook her head, confused.

“I meant keeping the pressure inside the green zone.”

“Well that. Trial and error,” she said. “After he left I tried buttons. The pressure rose. I tried a dial. It fell. I moved a lever and the lights dimmed throughout the way-station. By combining actions without understanding them, I managed to kept the needle near green and discovered what Arles later told me is the founding principle of reactor operations.”

“Which is what?”

“I don’t know. I forgot that part.”

“Then what happened?”

“The knocking.” Ary paused and looked toward the hall.

Bo looked too.

The portable air conditioner rattled. Water whispered beneath the floor grill.

“It came from inside the reactor,” Ary said.

“What did?”

“The knocking.”

“What kind of knocking?”

“People knocking.”

“People knock inside reactors?”

“Jokers do.”

Bo’s eyes grew larger. His replacement eye matched the old one perfectly now, so both widened together.

Ary picked at a spot of counterfeit gold leaf on her desk. “Maybe. I didn’t know what I saw. I was pretty dumb back then. It was two weeks ago, you know.”

“Two weeks! Yeah,” Bo agreed, “Feels like an eternity. Feels like my whole life.” It was his whole life.

Ary returned to the story. “The knocking had come three times. Slow.

Deliberate. Metal against metal from inside the shielded vessel. So I checked the pumps and I checked the pipes."

"Did you try knocking back?" Bo asked.

She shook her head, no. "I put one ear against the service hatch until the knocking came again on the other side of the plate."

"And?"

"So I opened it." She said and stopped as if that was all there was to the story.

Bo sat the on the edge of his seat and raised his eyebrows. "And?"

"Oh yeah. So after I opened it, a soldier climbed out."

"What? A soldier, from inside the reactor? What was he doing in there?"

"I have no clue. He wore a complete combat suit and carried a rifle. Frost covered his shoulders despite all the heat in there. His face was visible through his helmet. It looked ordinary except that he refused to look me in the eye. Never trust anyone who can't look you in the eye.

"He placed one boot on the floor, then the other. He slung the rifle over his shoulder and walked toward the exit ladder without speaking." Ary looked in the direction of the reactor across the hall, the memory fresh in her mind.

"I'm a professional forger but even I know not to go climbing around inside of those things. It's hot enough to kill a man by radiation before heat even enters the picture. And there is no space there big enough for a man to fit. There was no room to stand or sit. There was nowhere from which he could have climbed."

She looked at Bo deep in the eyes. He looked back. "I followed him out into the hall and saw him climbing the ladder so I say, "What are you doing?" He did not answer and kept climbing to the next level."

"He sounds really smart."

"Naturally I followed him. When I reached the landing I saw his boots disappearing through the next hatch above. I so climbed to the main floor after him but he was already at the far end of the corridor, moving toward the storage tunnel.

"He never ran. He never turned. No matter how fast I followed, the distance between us remained the same."

"He was well trained," Bo said.

“He entered the storage room and passed behind a stack of crates. I reached the crates not three seconds later. I told him he wasn’t allowed in there.”

“Reactor okay, but the storage room off limits. Got it.”

“But when I looked behind the crates there was nobody there.”

“Did he climb up another ladder?”

“There’s no ladders in the storage room. The boxes stood against solid ice. The nearest side tunnel was thirty meters away.”

“Cool.”

“Freaky.”

“I’m glad you didn’t tell anyone else, cause that sounds totally bonkers.”

Ary winched. “But I did. How could I not? Arles said reactors did not produce soldiers unless Jupiter had changed the design. Moe said I should stop drinking.”

“I’m still trying to figure out how to start.”

“I only drink a little,” she confessed. “But only when I need creative inspiration.”

“I have no idea what that is, but sounds hard,” Bo said.

“Exactly.”

The air conditioner stopped rattling. The office became quiet. Ary looked at the portable unit and Bo looked at the reactor room. For several seconds, nothing happened. Then three slow knocks came from beneath the grilled drain in the floor.

CHAPTER THIRTY-ONE THE EMPTY STATION

Bo heard Rbra calling him from somewhere in the station.

His name filtered through the ice as a cold echo. It seemed to come from the ladder shaft, the reactor room simultaneiously and then from the drain beneath Ary's desk and, finally, a place much farther away than the way-station possessed. Her voice was soft, stretched and ethereal, as though every wall repeated a different part of it.

"Bo!" The sound of her voice lingered.

Bo stood. "Sorry," he told Ary. "Gotta go."

Ary remained behind her desk. "Go where?"

"I don't know. Rbra's calling me."

Ary listened. Three knocks sounded beneath the floor. "I only hear that," she said.

Rbra called again.

Bo could not understand her words this time, but he recognized the irritation in her voice and considered that enough of a reason.

He crossed the short hall and climbed the ladder.

The first landing was empty. Crates that had filled the corridor that morning were gone. A cargo strap lay curled beside the wall. Its buckle rocked gently, though nothing had touched it. The lamps had been removed from alternate ceiling ribs, leaving bands of blue light and dark grays along the passage.

Bo climbed again. The next level was empty too. The squad had been packing. He knew that. He had seen them labeling boxes, draining equipment, sealing supplies and deciding what the new base required. But the place no longer looked packed. It looked gutted.

Storage cabinets had been torn from the ice and thrown onto the floor. Their doors hung open. Shelves were bare except for outlines in frost where objects had rested. Electrical cables ended in cut copper. Water lines had been capped. A ceiling panel swung from one fastener and struck the wall at slow intervals.

Bo entered the mess hall. The tables were gone. The food was gone.

The magnetic circles that had held them remained on the floor like pale

ghosts. Galley appliances had been ripped from their stations. The big stew pot was missing. So were the water pouches, biscuits, meat planks, knives, cups, spices and every crumb Bo had hoped packing people might overlook.

“Where is everyone?” he asked. No one answered, instead his voice echoed back from the dome smaller than when it left.

He searched the bunk rooms. Curtains had been pulled from their tracks. Mattresses were gone. Empty lockers lay on their backs. Serj and Rbra’s room had vanished, although the box of detonators had left a rectangular thaw mark beside the outline marking where the walls had been.

Bo called for Serj. Moe. Oan. Ick. Ricia. Arles. He called for Father Lvis and heard something in the corridor that might have been thank you very much.

Nothing appeared. The station grew colder while he searched. Warmth had stopped entering through the pipes. Frost formed over fittings that had been wet minutes before. Bo’s breath became a cloud. The steel cap on his abdominal port pulled heat from his body until the skin around it ached. His mismatched suit retained some warmth, but he wore no helmet or gloves.

He was very hungry in a place that had no food.

He opened every cabinet twice. He checked behind the galley panels, beneath the floor grill and inside a waste chute. The only edible object he found was a smear of dried stew on the wall. He scraped it with one finger and ate it.

The new white hand had begun obeying him better. It trembled anyway.

“Bo!” Rbra’s voice reverberated through the ceiling.

Bo followed it down the corridor. It faded near the ladder. He climbed to the lower level and heard it above him again.

Then the lights went out and emergency strips flickered along the floor, glowing red beneath clear ice. Bo descended by their light.

Ary was gone and her office was wrecked. Her metal desk lay on its side. Drawers had been pulled out and emptied. Blank identity cards covered the wet floor like white scales. Printers had been removed, leaving warm rectangular depressions in the ice. The portable air conditioner was gone. Without it, the room should have been warmer. It was colder than the bunk rooms.

The retreating ice wall had cracked. Water still ran beneath the floor grill, black and slow.

Bo looked beneath the desk, behind the curtain, inside the filing cabinet and through the grilled drain as far as the red emergency light allowed. “Ary? Where are you?”

The drain returned a whisper he could not identify.

Bo entered the reactor room. The control chair had fallen over. Arles’s radiation apron was gone. Green fungus had turned black along the edge of the outer shield. The control panel flashed without rhythm. Needles struck their stops hard enough to bend.

The reactor was shaking violently. Pipes had been shut off during the evacuation. Coolant circulation had stopped. Residual fission products continued producing decay heat even after the control rods entered the core. Water trapped inside the primary system boiled against closed valves. Steam pressure hammered through pipes and vessel walls with nowhere to go.

The main pressure gauge was broken. Its needle had passed beyond red, crossed the printed warning text, struck the internal stop and snapped off. The loose needle bounced inside the glass while the scale behind it blistered from heat.

The reactor vessel expanded and contracted with deep metallic blows. Knocking. Not three polite knocks now. Hundreds. Thousands. Every trapped bubble and vibrating pipe demanded entry or escape.

Bo approached the reactor service hatch. “Ary?”

He turned the wheel. The hatch opened into the inspection cavity. No soldier climbed out. No Joker waited inside. Ary was not there. Arles was not there. There was only shielding, steam, control-rod housings and blackness illuminated by occasional blue electrical arcs.

The reactor housing shook violently.

Bo closed the hatch. A pipe split overhead. Superheated water flashed into steam, struck the cold ice ceiling, and blasted fragments across the room. Bo covered his face with his new arm. The white skin blistered beneath the suit sleeve but did not let go.

He ran. Up one ladder, then another.

The station tilted around him, though the ice had no reason to tilt. Red lights became long lines. Rbra’s voice moved ahead, then behind, then

inside the place where the rattling in his skull had once lived. “Get out!”

Bo reached the main level. “Rbra?”

“Get out!”

He followed the corridor toward the airlock where he found only his helmet and gloves remained inside. They lay on the floor among empty ammunition cases. The cases had been stripped so quickly that unfired laser cartridges had left warm ruby circles in the frost. A roll of duct tape hung from an open maintenance locker.

Bo pulled on the gloves. His fingers were numb and stiff. The old hand would not enter its glove properly. The new hand closed too early and caught the lining. He forced each finger into place, sealed the wrist rings and picked up his helmet.

But there was a hole in the visor. It was no larger than a rifle cartridge and perfectly round. A crack ran from it to the edge of the glass. Bo looked through the hole with his replacement eye and saw the airlock wall sharply. Through the visor he saw the wall doubled and distorted.

He wrapped duct tape across the opening. One strip. Two. Five. He pressed the edges against the visor until the tape formed a pressure seal. It covered half the new eye and pulled his vision sideways, returning the world to two overlapping copies that disagreed about where doors were.

Bo locked the helmet onto his collar. “Rbra, I need your help.”

The old woman’s prerecorded voice did not answer. Someone had clipped the wires feeding audio into his helmet. Stupid.

“Why won’t you answer me?” he asked, as he pushed against the outer hatch.

It opened slowly, as discarded crates blocked its movement on the the other side. Beyond it at the end of the corrisor Bo could see the motor pool burning. He ran / hopped forwards as fast as he could, bouncing against the ice walls as he went.

Crawlers lay wrecked throughout the ice cavern. One had rolled onto its side. Another had been split through the steam plant. A motorcycle rack burned with a hard white flame. Metal glowed along opened reactor compartments.

In vacuum, ordinary fire could not live without oxygen. These fires had been given assistance. Beyond reach of the flames, several oxygen tanks stood upright against the wall. Their valves were open.

Hoses ran from the tanks into the wrecked vehicles, pumping oxygen directly into engine bays and cabins. The gas made insulation, lubricant, suit fabric, tires and human belongings burn in an environment where fire should have died. Each flame formed a narrow torch that bent only when escaping gas told it which direction existed. Someone had wanted the motor pool to keep burning.

Bo saw no bodies. He hopped between wrecks toward the cavern entrance. Heat struck one side of his suit while cold pulled at the other. The duct tape softened over his visor. Smoke could not drift through vacuum, but vaporized metal and frozen combustion products spread in glittering ballistic arcs.

“Bo, where are you?” Rbra’s voice came through his helmet radio.

He stopped. Short-range suit communication reached only about fifteen feet. Rbra was not within fifteen feet. She was not in his eyesight. She was not reflected in the visor or crouched behind a crawler or standing on the low road. “Rbra?”

“Get out before the reactor blows.” Her voice contained static, distance, and something beneath it that sounded like a crowd speaking backward.

“Where are you?”

“Run.”

The floor jumped. A crack crossed the ice beneath the wrecked crawlers. White steam burst from the airlock tunnel behind him. The inner station pressure found the fracture and vented into the cavern, carrying fragments of wall, papers, blankets and one yellow rubber duck from Arles’s collection.

Bo ran. In Callisto’s gravity, running became a chain of long leaps. He cleared an overturned sled. He struck a crawler hood, rebounded and landed near the cavern opening. The low road waited beyond it, narrow and black against the vertical wall of the crevasse.

The reactor did not explode like a nuclear weapon. Its pressure vessel failed. Superheated water became steam almost instantly. The primary loop tore through shielding while hot metal entered cold ice. Ice became additional steam. The expanding gas found tunnels, rooms, ladder shafts and the abandoned airlock, converting the entire way-station into the barrel of a buried gun.

Bo reached the point where the motor pool met the ice road just as the base exploded behind him. The cavern exhaled a wall of steam, shattered

ice, burning machinery and everything the squad had left behind. It struck Bo between the shoulders lifting him and his boots off the road. The crevasse opened beneath him.

He flew across the gap toward the far wall. For one moment, he saw the opposite ice rushing toward him through two misaligned views. Then Bo blacked out.

CHAPTER THIRTY-TWO FOG WITHOUT AIR - SHOOTOUT ON THE ICE ROAD

Bo woke lying on his back in the cargo section of a crawler. Flashes of laser fire streaked across his vision like fireworks.

The retractable cargo roof was gone, not retracted; shorn off, leaving mangled control arms behind. Half of one cargo wall was gone too. Jagged metal side walls curled outward above him. In his peripheral vision, the blue-black walls of the crevasse swerved side to side while the crawler careened around corners on the ice road.

The red pulses flashing overhead existed for only milliseconds, but their afterimages formed bright lines across Bo's retinas. Impacts flashed against the opposite wall. Ice exploded in silent white flowers. Farther away, something larger detonated. Bo saw the light, counted without knowing why, and felt the rumble enter through the crawler's tracks several moments later.

There was no fog on Callisto. There was almost no air in which fog could form. There was nevertheless fog everywhere.

It occupied Bo's thoughts, the duct tape across his visor, the static in his helmet and every uncertain shape moving above the cargo rail. Friends and enemies appeared in fragments. Orders arrived after their consequences. Memory spread through the battle like smoke physics had forgotten to prohibit.

A blurry red face leaned over him.

"Rbra?"

"There he is!" a familiar voice said.

Bo reached up and wrapped both arms around her.

It was not Rbra. Ricia pushed him back onto the deck. Her green face appeared red through blood smeared across the outside of his visor and the emergency tint inside it. Orange hair floated beneath her helmet like fire trapped in glass.

"Why are you red?" Bo asked.

"Lie down. You've been hit."

The crawler struck an ice ridge. Everyone rose several inches from the deck and returned in different positions.

Soldiers filled the open cargo section. Etty fired from the left side. Ick braced a heavy rifle against a repaired armor plate of his suit. Oan fed them both laser magazines from an open case. Moe stood near the cab, shooting upward at something Bo could not see. Arles crouched among ammunition crates with far too many grenades attached to him.

There was a red flash and Moe dropped his rifle screaming. “My shades!”

Bo sat up and noticed a dead body lay near the cab.

The helmet visor was cracked, but the enormous black bouffant inside identified Father Lvis. One pistol remained in his hand. The little Bible at his waist had opened, revealing hollowed pages full of ammunition.

Thank God it was not Rbra.

Ricia caught Bo’s shoulder. “Sit still. You might be hallucinating.”

He ignored her. A service rifle lay beneath the dead chaplain’s leg. Bo pulled it free, got onto his knees, and rested the barrel over the barely intact tailgate.

He had no idea what he was shooting at but his engineered combat instincts did. The instincts lived beneath education, memory and judgment. They recognized hostile movement, incoming fire, weapon balance and the correct direction in which to make the rifle dangerous. Bo’s conscious mind saw flashes. The vat-grown parts of him saw trajectories.

He fired into the fog. The rifle ejected a spent laser cartridge. Molten liner residue froze as bright specks behind the ruby beam. Bo fired again and again while the crawler bounced beneath him.

Shapes resolved through the duct-taped visor.: two military buggies. They pursued them on the same ice shelf. Their six wheels flexed independently over ridges. Heavy rifles fired from powered mounts above the cabins. The lead buggy carried the third lieutenant, his red-tan face visible behind armored glass.

A third buggy ran on a parallel road carved into the opposite crevasse wall twenty meters higher. It appeared above the crawler and slightly behind, firing downward across the gap. Its laser pulses struck the road, the cargo rail and places Bo had occupied fractions of a second earlier.

Bo aimed. The target leaped within his damaged vision. The road curved. The crawler tilted. His replacement arm tingled and corrected against motions he did not understand.

He fired again. A red pulse struck the lead buggy's radar dish. The dish stopped spinning and shed half its rim. Bo fired another round. The beam cut a weapon mount on the second buggy. Its heavy rifle rotated sideways and discharged into the wall.

"Yeah! That'll teach 'em." Bo shouted.

Nobody heard him over the open radio channels, shouted ranges, suit alarms and Ricia ordering him to lie down.

The rifle clicked empty so Bo dropped below the tailgate to reload.

Ary sat beside him, holding one arm against her chest. The arm was no longer attached. Her suit sleeve ended in a shredded pressure cuff near the shoulder. Unlike Bo's military suit, Ary's civilian equipment had not sealed the wound cleanly. Blood oozed through emergency foam, crossed the front of her suit in dark red beads, and froze where it reached the cold outer fabric.

Ary rubbed the stump up and down. Frozen blood cracked away. Fresh blood seeped out and froze again.

"Stop doing that," Bo said.

"It itches."

"Someone wrecked your desk."

Ary groaned.

Bo could not tell whether this meant she understood, did not understand or had left something behind at the way-station.

Arles sat next to her with a grin on his face. Grenades covered his chest, waist and thighs. His armor was decorated with stickers of yellow rubber duckies. He pulled a pin, tossed the grenade backward over his head without looking then selected another before the first had left the crawler.

His first grenade landed on the road behind them. The nearest buggy swerved to avoid it. The explosion tore ice from the shelf and threw fragments across the crevasse.

Arles laughed.

"What are you aiming for?" Bo asked.

"Chaos and pandemonium."

Ricia crawled between them. "Bo, you've been shot in the head."

Bo pushed a fresh magazine into the rifle. “Is that why I can’t see clearly?”

“Partly.”

She turned his helmet enough to examine the rear. A laser had entered through the back shell, passed through his skull, and exited through the front visor. The helmet’s self-sealing layers had closed around the rear channel. Tissue foam had filled the narrow wound through his head. The front exit hole in his visor had been covered with duct tape.

“The tape is blocking your vision,” Ricia said.

Bo reached for it.

Ricia seized his wrist with both hands. “Do not remove that.”

“But you said it’s blocking my vision.”

“It’s also blocking the vacuum.”

Bo lowered his hand. He was hungry and tired and for some reason could not feel his fingers. He could not see straight and his head contained a tunnel that had not been there before.

He finished reloading.

Ricia spoke calmly, as if asking a patient to confirm his address. “Do you remember packing the station for two days before we left?”

Bo rose onto his knees and fired over the tailgate. “I remember everyone not being there.”

“We packed for two days.”

Bo fired again. “I remember the reactor exploding.”

“That never happened.”

“It threw me across the crevasse.”

“No, it didn’t.”

Bo shrugged and kept firing.

Someone behind Bo was hit. The body fell against him and knocked him onto the deck. He rolled over and caught the soldier in both arms. Between the cracks in her helmet dark hair floated behind the visor.

“Rbra!”

It was only Rothy, the clerk. Relieved, Bo dropped her onto the deck.

Rothy's eyes closed. Her radio earpiece continued transmitting casualty reports beside her cheek.

Bo stood in the swaying cargo bed. "I will avenge you, Rbra!" he sounded into the radio ether.

"That's not Rbra!" someone screamed.

Bo fired in every direction. One beam passed above the upper buggy. Another struck the road beneath the crawler. The third cut a lamp from the wall. The fourth hit the rear suspension of the closest pursuing vehicle.

The lead buggy rammed their tailgate causing Bo to jump involuntarily out of the crawler. He went with it using his suits built in mini thrusters to help him cross the gap between vehicles. He floated for a moment in Callisto's low gravity before landing on the buggy's hood.

The third lieutenant's soldiers turned toward him with long daggers drawn.

Etty, Serj's sharpshooter, fired from the crawler. Her first shot struck the gunner through his visor. Her second disabled the powered rifle before it could rotate. Her third cut the hand of a soldier reaching for Bo. Every pulse arrived close enough to Bo that he felt the heat flash through his suit.

Bo swung his rifle like a wrestling approved folding chair. He struck one soldier in the helmet. The man floated backward out of the weapon well. Another grabbed Bo from behind. Bo threw him over one shoulder and into the road. This was followed by a large bump in the road. A third soldier attempted to draw a dagger, discovered Etty had removed most of it and considered his retreat options.

The driver abandoned the controls to fight. Bo ducked under him and took over the controls. The buggy's steering system had two grips, four pedals, a knee lever and a mini CRT displaying terrain guidance. Bo pulled both grips because that had stopped the crawler before.

The buggy turned sharply into the crevasse wall. Armor struck ice and wheels collapsed. Bo saw the wall fill his taped visor.

The second pursuing buggy crashed into them. Propellant cells, ammunition and oxygen reserves ruptured together. Both vehicles exploded.

Bo woke lying on his back in the cargo section of a crawler in the middle of a firefight. The cargo roof was gone. A blurry red face leaned over him.

“Rbra?”

“There he is!” Ricia said.

Bo tried to sit up.

Ricia pushed him down. “You were hit in the head.”

Bo stared at her through duct tape and blood. “What’s going on? Why aren't I dead?”

“You might have some memory problems.”

Déjà vu all over again. Bo peered over the tailgate. Three buggies still chased them. Two occupied the road behind. One ran above on the opposite wall. The lead radar dish spun without damage. The third lieutenant sat behind the glass, alive, red-tan and closing.

Bo grabbed a rifle from Lvis and spun without aiming and fired. He missed. He fired again. The beam passed between the buggies. A third shot struck nothing he could identify. The combat instinct that had aimed for him was gone, or had not happened yet, or belonged to a memory of something his body had never done.

Bo dropped behind the tailgate.

Ary sat beside him with her arm missing. Rothy lay unconscious near the cab. Rbra was dead in the corner. Everything was exactly where he remembered it, except the wrecked buggies were not wrecked and Bo had never left the crawler.

Arles grinned among his collection of grenades.

“Mind if I borrow one of those?” Bo asked.

“Borrow three.” Arles tried to unhook a grenade from his chest. His glove caught two adjacent pins. He pulled and six safety levers sprang away. Live grenades dropped into the cargo bed. They bounced among boots, magazines, frozen blood and the dead chaplain’s hollow Bible.

Arles looked down. “Oops.”

Everything exploded.

CHAPTER THIRTY-THREE BAD LUCK VS INCOMPETENCE IS A KICK IN THE BELLY

The third lieutenant limped out of the buggy wreckage.

The vehicle had struck the crevasse wall nose-first, folded through its middle, and stopped with two wheels hanging over the edge of the ice road. Its radar dish lay farther down the shelf in three pieces. The second buggy had crashed into the first and burned until its oxygen reserve emptied. Beyond them, the road curved around blue ice and concealed whatever had escaped.

The lieutenant's left leg dragged behind him. His pressure suit had sealed a cut along the thigh and filled the damaged joint with rigid foam. Each hop carried him forward, landed on the good foot, and ended in a controlled stumble.

Someone moved inside the second wreck. A subordinate climbed out through the weapon well. His helmet was scorched. One shoulder plate was missing, and his suit displayed so many warning lights that he resembled a small emergency vehicle.

He hopped after the lieutenant. "Sir."

The lieutenant stopped beside the outer edge of the road. The crevasse dropped away next to him, blue for the first hundred meters and black for everything below. He turned and looked at the other soldier like he was a menu at a zero star diner. "What caused this?" he asked.

The subordinate looked back at the wrecks. Fragments of a third buggy remained scattered across the higher parallel road on the opposite wall. A motorcycle wheel spun slowly in empty space. A rifle magazine slid across the ice, reached the edge, and disappeared. "We outnumbered them three to one," he said.

"That's what happened. I asked a different question."

The subordinate looked back his commander. He had such hope in his eyes yet he did not want to disappoint. He had nothing to say but he had to say something. "Bad luck," the subordinate answered. His voice sounded nervous even after the helmet radio removed the tremor.

The lieutenant considered him. "Bad luck?"

"Yes, sir."

"Explain the distinction between bad luck and incompetence."

The subordinate searched his training, found nothing, and attempted survival through agreement. “Bad luck is unpredictable, sir.”

“And incompetence?”

“Predictable?”

“Incompetence is entering a confined road system without controlling the upper shelf. It is placing two pursuit vehicles close enough that one collision destroys both. It is allowing an injured soldier with obstructed vision to board a moving buggy. It is aiming three heavy rifles at one crawler and striking the wall.”

“Yes, sir.”

“Bad luck is not a name for the consequences of decisions.”

“No, sir.”

The lieutenant limped closer. “Bad luck is the event no competent person could reasonably anticipate.”

“I understand.”

“No. You understand incompetence. Let me demonstrate bad luck.” He kicked the subordinate in the chest.

Callisto’s weak gravity made the kick gentle by ordinary standards and decisive by geographical ones. The subordinate left the road in a slow backward arc. His hands reached for the lieutenant, the wreckage, and the ice edge in that order. He touched none of them.

He fell into the crevasse back first. For several seconds his helmet lamp remained visible beneath the road, shrinking as it descended. The open radio carried one confused breath, then a question, then static. The light became a pale point and vanished into the abyss.

The lieutenant watched until it was gone. “That’s bad luck,” he said.

He continued limping. The ice road was littered with cartridge cases, broken armor, frozen blood, and evidence that the battle had occurred in some form. No wrecked enemy buggy remained on the shelf. No bodies from Serj’s crew lay among the debris. There were grenade marks in the wall but no crater where a cargo bed should have exploded.

The lieutenant activated his long-range radio. “Pursuit command to reserve unit. Respond.”

Static moved across the channel then, “Reserve unit receiving.”

“My vehicles are disabled. Target continues west on the lower shelf. Send motorcycles.”

“Authorization code?”

The lieutenant transmitted the same sanitation code that had launched seven stolen hoppers. “Purple flowers.”

The radio paused. “Code identifies cleaning operation.”

“Then bring brushes.” The lieutenant walked another hundred meters before the motorcycles arrived.

Their vibration reached him through the road first. Headlamps appeared around the bend. Six machines followed, each fitted with spiked drums, armored tanks, and laser rifles mounted beside the handlebars.

The lead motorcycle had a sidecar where a heavy weapon occupied the front of it: a belt-fed laser-cartridge gun on a powered swivel, protected by a curved armor shield. The driver stopped beside the lieutenant, dismounted, saluted then climbed into the sidecar without being asked. He settled behind the weapon and connected its firing grip to his suit.

The lieutenant took the saddle. His damaged leg would not bend properly. He locked it against the outer frame, gripped the controls, and opened the steam throttle. The motorcycle’s turbine rose through the frame as a tightening vibration. Exhaust vapor struck the cold road and froze behind the machine in a white trail.

“Direction?” the gunner asked.

The lieutenant looked west, where the low road curved out of sight. “Forward.”

The motorcycles accelerated together.

They rode into the darkness of the crevasse, following Serj’s crew and their uncertain remains.

CHAPTER THIRTY-FOUR ICE MOTEL

Bo woke lying on his back in the cargo section of a crawler. Again.

The cargo roof was gone. Again. The same jagged metal bed walls curved above him. The same duct tape crossed his visor. His head hurt in a familiar place.

“This is starting to get annoying,” Bo mumbled.

The crawler, however, was no longer inside the crevasse. It traveled across the surface through one of Valhalla’s outer grooves: a long valley between concentric impact ridges. High walls rose on both sides, shielding the valley from distant battle lines and making the route resemble a shallow scar inside a much larger scar. The valley floor was a wide field of boulders cut with the road scar made from crushed regolith rather than carved ice. Wide enough for two crawlers, it felt extravagant.

To top off all this extravagance, no buggies were following them.

Serj and Moe rode in the open cab beyond the front bulkhead. The crawler’s long chassis placed them outside the fifteen-foot helmet-radio range. Their shoulders moved when they spoke. Maybe Bo didn't know what fifteen-feet was, or maybe they knew a way to override the automatic radio connections, but he heard only static, track vibration and the occasional clank of damaged armor.

Ricia leaned over him. Her face was green again.

“What happened?” Bo asked.

“You were shot in the head.” She said it like it was the first time.

“I know that already.”

Rothy lay in the far corner of the cargo bed. The clerk’s suit was opened around a pressure dressing beneath her ribs. Her breathing came slowly, each breath separated from the next by enough time for Bo to wonder whether another one intended to arrive.

Ary lay flat beside her. She did not move. One arm ended at a clean metal cap where her forging hand had been. Someone had removed the damaged sleeve and wrapped her torso in thermal blankets. Her remaining hand still held a corner of a blank identity card.

“Is she dead?” Bo asked.

“No. She only had her arm blown off.”

“Oh.”

Bo looked toward the cab.

Father Lvis’s helmet rested near an ammunition case. No body was attached. Behind the visor, only his enormous black bouffant was visible, compressed against the glass like a dark animal preserved in a jar.

“What about him? He looks dead.”

Ricia followed his gaze. “No, he's not. Ary is the only casualty.”

Bo looked at Rothy’s shallow breathing. He looked at Ary’s capped wrist. He looked at the helmet full of hair.

Father Lvis sat upright beneath the hair and smiled at him. His helmet was on his shoulders. His body occupied the suit beneath it. The little Bible remained strapped to his waist. He raised two fingers in blessing. “Awake in the promised land,” Lvis said in his low voice. “Where all shook up shall be comforted.”

Bo blinked. “What the huh?”

Ricia checked the seal on his patched visor. “Bo, you might have memory problems.”

“Yeah. You told me already, like five times.”

“When?”

Bo tried to remember. The attempt produced buggies, grenades, a reactor, a dark soldier, Rbra dying several times, Rbra not dying and Arles saying oops. “Before,” he said with a wave of his hand, “All this.”

The crawler continued down the valley for several hours arriving at a small Callistonian village around 2100 local time. Callisto’s long morning still occupied the sky, but the settlement clocks had reached evening and behaved as if astronomy had agreed.

The village covered roughly six acres of the valley floor. It consisted of a chain of pressure domes that rose from the regolith like low glass bubbles. The largest protected fields of grain, fungus beds, and rows of leafy vegetables trained along wires. Smaller domes were homes, shops, workshops and communal rooms. Inflated passage tubes connected some structures. Others relied on individual airlocks and exterior streets open to vacuum. Suited pedestrians plied the open streets. There were no sidewalks.

Agricultural crawlers moved through traffic carrying water tanks,

compost bins, seed racks and long harvesting arms. Motorcycles passed between them. Callistonians on bicycles pedaled along the roadside in narrow pressure suits, their long legs turning slowly enough that the bicycles appeared to move without effort.

No Jupiterian military vehicles were visible. No checkpoints blocked the trail. No officer inspected papers. There were no recruitment posters, no missile batteries and no public address system explaining who had really liberated the village.

This absence made Serj cautious. He steered into the parking area beside a convenience store. The building was a small pressure dome illuminated by green and yellow signs. Through the transparent panels, Bo saw shelves of packaged food, repair supplies, water filters, newspapers and a counter attended by a Callistonian tall enough to reach every shelf without assistance.

Serj stopped the crawler but left the reactor and steam plant running. He turned in the cab and raised his radio power enough to reach the cargo bed. “Everybody waits here.”

He crossed the parking area, cycled through the store’s airlock and disappeared inside.

Bo looked around at the others. They looked back at him. Etty, Ick, Oan, Pell, Ricia, Rothy, Arles, Father Lvis, Miss Rothy again (no, there was only one Rothy). Moe turned to face him from the cab. His left eyeglass was shattered. The other remained cool as ever.

Bo reached behind his helmet. His gloved fingers found a hardened repair patch in the rear shell. The material was rough and slightly raised. A laser had indeed entered there. The channel beneath it ran through his head toward the duct tape on the visor.

He looked for Rbra. She was not in the cargo bed. She was not beside the cab. She was not reflected in the store dome or standing among the bicycles.

Bo lowered his head. He breathed.

The suit circulated each breath past his face, removed carbon dioxide, warmed the oxygen and returned it. He listened to that small machine keep him alive while memories rearranged themselves behind the hole in his forehead.

Serj returned a few minutes later carrying a paper envelope and four metal keys with plastic diamond fobs attached. “Got us rooms at the

motel on the other side of the village."

"For how long?" Moe asked.

"Long enough to change vehicles. Our careers will have to wait a bit longer."

The crawler pulled out. They traveled slowly through gravel streets between the pressure domes. The gravel consisted of rounded regolith pellets sintered hard enough not to become dust beneath tracks. Callistonians stopped to watch them pass. Their long helmets turned in sequence. A child on a bicycle followed for half a block until an adult caught the rear rack and lifted both bicycle and child off the ground.

They passed a post office inside a silver dome. A hand-painted sign advertised UNITED MOONS OF JUPITER POSTAL SERVICE. Next came a barber shop with a pressure window displaying photographs of haircuts for heads twice the normal length. Then a laundromat, a bicycle repair stall and a small temple without gods or parking.

The motel stood at the far end of the village. It was a row of identical pressurized quanset huts buried halfway into the valley floor. A red sign above the office read VALHALLA REST – VACANCY – FREE OXYGEN.

Serj parked behind the motel where the crawler could not be seen from the main road and distributed the keys. "Four to a room. Stay inside. Keep helmets ready. I'm disposing of the crawler."

"Where?" Ick asked, his livelihood on the line.

Serj looked back and him and shook his head.

Ick looked at the hundred-foot trail of damaged tracks leading to the motel and decided not to request detail.

Bo received a room with Father Lvis, Moe, and Arles. The room's exterior airlock was barely large enough for one soldier. They entered individually. Bo waited outside while the others cycled through, then squeezed inside and closed the hatch behind him. The chamber pressurized with air that smelled like mildew and mothballs.

A small closet inside held racks for helmets, gloves, boots and anything else not desired in bed. Bo removed his helmet carefully. The duct tape stayed attached to the visor. Cold air reached the exposed channel's repair scars and made his scalp ache.

The room contained two small single beds with a nightstand between them and four soldiers stood between them taking inventory.

The nightstand supported a lamp, a water carafe, a printed evacuation map and one mint sealed in plastic. A black-and-white television faced the beds from a fake wood credenza. The carpet was green. The walls were pale yellow. A framed photograph showed Jupiter rising over a Callistonian farm, despite Jupiter being in the wrong part of the sky.

Loud wailing came from the room next door. It rose through the wall in long cries, paused, and began again. Bo could not determine whether someone was in pain, singing, mourning, operating a power tool, or receiving motel service.

Irritated, Moe turned on the television to drown out the sound. A sports broadcast appeared in grainy black and white. Two teams of low-gravity athletes chased a floating ball through a cylindrical court while commentators disagreed about the rules. Moe increased the volume until the crowd noise covered most of the wailing. He sat back on one bed and kicked off his boots. His shades, despite being half shattered, remained stubbornly on his face.

“Can we watch wrestling?” Bo asked.

Moe laughed.

“What’s funny?”

“Nothing.”

“So can we?”

Moe increased the volume again.

Bo gave up and tried the bathroom door but it was locked. Bo put his ear up to it. He heard running water inside alongside Father Lvis’s voice, his deep voice vibrating through pipes and tile. “You ain’t nothing but a shepherd,” he sang, “walking through the valley of the shadow of death… all the time.”

Bo knocked.

Lvis ignored him and kept singing.

Bo went to back to the beds. Moe occupied the first one fully and Arles lay across the other bed in his yellow-duck pajamas, arms spread, feet hanging over one side. His head was buried beneath both pillows and an empty mint wrapper on top.

“There are four of us,” Bo said.

“Correct,” Arles mumbled, beneath the pillows.

“There are two beds.”

“Also correct.”

Bo looked at the nightstand. Too small. He looked beneath the beds. Luggage, boots and a portable reactor gauge occupied the space. The bathroom remained full of song.

He found an empty corner between the television credenza and the airlock closet. Bo curled onto the carpet in his mismatched suit. He used his white replacement arm as a pillow. It tingled against his cheek and closed its fingers slowly around nothing.

The television crowd cheered. Father Lvis sang. Someone wailed in the next room. Moe laughed at sports he had not explained. While Arles began snoring beneath the yellow ducks Bo fell asleep still hungry.

CHAPTER THIRTY-FIVE STRAWBERRY TOOTHPASTE FOR BREAKFAST

At 0800 Bo woke up.

His replacement arm was stiff from sleeping on it. It had spent the night folded beneath his head and had apparently concluded that this was its permanent military assignment. When Bo told it to straighten, the fingers tightened around his ear instead.

There were now three cots in the motel room and Bo decided to stared at them. There had been two beds when he went to sleep, not three. He was fairly sure of this because the shortage had been the principal reason he had slept in a corner on the carpet. A third folding cot had appeared sometime in the night and had been wedged between the other two with such precision that none of the room's furniture could now be used.

Father Lvis slept on it. The chaplain lay flat on his back beneath a motel blanket. His black bouffant rested on the pillow without losing any altitude. One hand clutched his little Bible. The other hung over the side and almost touched both beds at once. Below it an empty beer bottle lay on the stained carpet.

Moe and Arles were gone. Their blankets were rumpled. Their helmets were missing from the rack beside the airlock. Arles had left one yellow duck sock hanging from a lamp, but this provided no useful tactical information.

Bo got dressed, which consisted mostly of locating his boots and arguing with his new arm. He sealed his mismatched suit, pulled on his gloves, and fitted the patched helmet over his head. The strip of duct tape across the visor made the left side of the world look permanently censored.

He cycled through the one-person airlock and stepped onto the motel's exterior walkway.

The walkway was ice. It had once been textured for traction, but a century of boots had polished the surface to a pale blue shine. Bo pushed off with one foot and discovered that he could scoot the length of the motel without taking another step. In Callisto's low gravity he moved slowly, silently, and with the dignity of a six-foot-four soldier being delivered along a frozen lunch counter.

He peeked through each motel window as he passed.

One room contained three empty beds and a bathtub full of rifles.

Another held Etty asleep upright in a chair with one eye open. In the next room somebody had hung wet pressure suits across the window. Bo recognized Oan's sewing kit on a table but no Oan. He saw a pile of boots, a crate of toilet paper, half a biscuit, and a man he did not know combing hair over to hide a bald spot.

Bo reached the end of the motel and stopped himself against a railing.

The village seemed deserted. The pressure domes were dim. No agricultural crawlers rattled along the gravel streets. The post office was closed. The barber shop's revolving pole had been turned off, depriving the vacuum of a service it had not been able to see anyway. Bicycles leaned against walls with no riders nearby. Beyond the transparent roofs, Callisto's immensely long morning continued without consulting the clocks.

Bo wondered whether everybody had been killed during the night.

Nothing appeared damaged. There were no bodies. No smoke. No fresh craters. Still, he had recently learned that death could occur without leaving the kind of clues he expected, and sometimes could occur several times to the same person.

Maybe Serj had scared them away. That seemed more likely.

A small Callistonian child suddenly rode past on a bicycle. The child was almost as tall as a Jupiterian officer and thin enough to pass between fence slats. A transparent bubble helmet enclosed a narrow face. The bicycle had enormous wheels, a patched frame, and bags of vegetables tied over the rear tire. Child and bicycle traveled very slowly in order not to be launched into the absence of air.

The child waved cheerful at Bo like they'd been neighbor for years. Bo waved back.

"Knock it off and get inside," a voice said in his helmet.

Bo lowered his hand and looked around. He could not see anyone within fifteen feet. The voice had come through a stronger radio channel, which meant whoever spoke possessed either better equipment or less interest in walking over to him.

"Okay," Bo said.

The child waved again. Bo performed a smaller wave below his waist where he hoped the radio could not see it.

He found the nearest public airlock and entered the pressure dome

attached to the motel office. The outer hatch closed. Pumps groaned, frost slid off his suit, and a green light informed him the air was only mildly poisonous. Bo removed his helmet anyway.

Everybody else was inside the motel's little breakfast room except Father Lvis, Ary, and Rbra.

Two round tables had been shoved together. Serj sat at one end with Moe, Ricia, Arles, Etty, Ick, Rothy, Oan, Miss Rothy … (Bo blinked until there was only one Rothy) … and the remaining members of the squad. Rifles leaned against the wall within reach. A few battered crates were stacked at the back of the room beneath a handwritten sign that said COMPLIMENTARY ICE.

They were eating military field rations and arguing. Jupiterian Meals Ready to Eat did not come in boxes or pouches. They came in tubes. Each tube was made of gray flexible metal with one crimped end and a screw cap at the other. The contents could be squeezed directly into the mouth, a helmet feeding port, a radiator leak, or any other opening a soldier was willing to accept responsibility for.

Labels identified the flavors. Most had worn off.

Bo found a clean white tube marked STRAWBERRY in cheerful red letters. He twisted off the cap and sucked. The paste was cool, smooth, minty and only distantly reminiscent of strawberries. Bo liked it. It made his damaged head feel clean on the inside.

At the tables, plans for Ary's funeral competed with plans to replace everything lost at the ice station.

"We don't know that she's dead," Ricia said.

"She's frozen solid, for crying out loud," Arles replied. "You can't get much deader than that."

"The military has special machines…" Rothy began weakly.

"In orbit, for officers only," Moe interrupted, shaking his head. "Attempt that heist would get us all killed and Ary would still be frozen solid."

Bo stopped sucking on the tube. "Ary's dead?"

Nobody answered him.

They continued speaking about Bo in the third person, as though he were not present and had merely left his body beside the breakfast table.

"She's not dead until she's warm and dead," Ricia said.

Moe continued, “Ary deserves a proper funeral.”

“And we need to get the frak out of here,” Arles said nervously. “We’re sitting ducks.”

Moe looked him up and down. “Speak for yourself, old man.”

“Bo agrees with me, right kid?” Arles said turned to Bo.

Bo looked up still sucking on his tube. “What?”

Rothy pointed out that, “Bo isn’t a reliable witness considering everything.”

Bo lowered his tube to defend himself. “I remember being unconscious.”

Serj rubbed both hands down his face. “Nobody ask Bo what he remembers until Ricia decides which part of his brain is answering.”

“I’m right here,” Bo said.

“Exactly.”

The argument separated into several smaller arguments.

Ricia wanted Ary taken to a Callistonian clinic, alive or otherwise. Moe said the clinic would report a military casualty. Etty wanted to bribe the clinic. Rothy pointed out that most of their bribe money had been inside the station. Arles proposed ditching the body and hijacking an ag wagon to escape on.

This produced the only unanimous decision of the morning. No.

At the back of the room sat the remains of their smuggling operation: four crates of toiletries, one crate of counterfeit seals, half a case of Titanian cigars, two rolls of suit fabric, assorted identity blanks, and a cardboard box labeled PLUTONIUM - COOKING USE ONLY. Everything else had burned, exploded, been abandoned, or been left underneath the crawler when Serj disposed of it.

“We lost three crawlers,” Ick said.

“Two,” Moe corrected.

“The third one knows what it did.”

“We lost the reactor,” Arles added as if someone were keeping track.

“It was making noises.” Bo squeezed more strawberry into his mouth. “I fixed it.”

Every person at the table looked at him.

“What exactly did you do, private?” Serj asked.

“I kicked it.”

Arles slowly removed his spectacles and polished them on his pajama sleeve. “That’s the spirit. I’ll make an engineer out of you yet, kid.”

The conversation continued on in circles and Bo grew bored.

Oan sat alone in the corner. She held a length of scorched spacesuit fabric in her lap. Her sewing kit was closed beside her. Since Bo had entered, she had not looked up or said a word. Her little shoulders curved inward as if she were trying to fold herself small enough to store in one of the surviving crates.

Bo carried his tube over to her. “Want some strawberry?”

Oan looked at the tube. Then she turned her face toward the wall.

Bo stood there a moment. He did not know whether she was angry with him, sad about Ary, mourning the suits lost in the station, or simply did not like strawberry. He understood the last possibility best.

“It’s got a funky mint flavor,” he said helpfully.

Oan closed her eyes.

Bo returned to the table.

The discussion had moved to transportation. Without the crawler they could not move the wounded, the crates, or Arles at any speed Arles considered humane. They needed new papers because Ary’s forgery hand was gone. They needed a base, weapons, oxygen, food, medicine, fuel, and somewhere to hold Ary’s funeral without attracting the Jupiterian military.

They also needed Rbra.

Nobody said that part aloud while Bo was listening.

“We’re finished,” Rothy said. Her voice was faint but precise, like a clerk dictating her own surrender form. “The network’s gone. The inventory’s gone. Half our contacts will assume we’re compromised. The other half will charge double because we’re not.”

“We can sell the cigars,” Etty said.

Serj placed one protective hand on the remaining case. “We are not that desperate. Yet.”

“We’re planning a provisional funeral in a motel breakfast room.”

“Not that desperate.”

Moe leaned back in his chair. “Then what’s the plan?”

For the first time since Bo entered, the room became quiet.

Serj looked at each of them. His gaze paused on Rothy’s bandages, Oan’s scorched fabric, the nearly empty crates, and finally Bo, who was still sucking loudly on the strawberry tube.

“I have a lead,” Serj said.

Moe’s expression changed. “What kind of lead?”

“A good score. Enough to replace the equipment, buy new papers, and set up another base. Better than the old one.”

“Where?” Ricia asked.

“Close.”

“What is it?” Etty asked.

“Valuable.”

“Who wants it?” Arles asked.

“Somebody who won’t deserve it once I explain why.”

Nobody found this reassuring.

Serj leaned forward. “We are not finished. We are not stranded. We are not burying anybody without a proper funeral first.”

“And if the lead is bad?” Moe asked.

“Then we’ll improve it.”

The disagreement started again, louder than before.

Bo finished his breakfast. He rolled the empty tube from the crimped end to squeeze out the last trace of strawberry, then read the smaller print that had been hidden beneath his thumb.

EXPIRED DENTAL PASTE, it said. CHILDREN’S STRAWBERRY. DO NOT SWALLOW.

Bo looked around the table. No one had noticed. He licked the cap clean and put the tube in his pocket for later.

CHAPTER THIRTY-SIX CALLISTONIAN FUNERALS REQUIRE DYNAMITE

The cemetery stood outside the village pressure domes, exposed to Callisto's vacuum surface.

It occupied the flat top of a low hill at the edge of the valley. Long ago the hill had been an ice spire, one of the tall blades thrown up by Valhalla's ancient impact. Centuries of micrometeorites, quakes, thermal stress, careless landings and one documented attempt to build a ski resort had worn it down to a broad block with a level crown.

The Callistonians had put their dead there because the view was good and the land was otherwise useless.

Grave markers rose from the ice in uneven rows. Some were carved stone hauled from deeper layers of the crust. Others were pieces of ship hull, crawler track, glass, ceramic or old pressure doors with names engraved across them. Thin wires anchored every marker against quakes. None carried photographs. The dead were expected to remember what they looked like.

Bo and the others came up the hill in their spacesuits shortly after 1300. It had taken Serj a couple of hours to make the arrangements after breakfast.

They carried Ary in a long white wrapping reinforced with suit-repair tape. Oan walked beside the body with one hand resting on it. She had sewn Ary's name into the fabric over and over in different colors until the letters covered nearly the entire length.

At the top, two Mooninite grave diggers waited beside a smoking machine.

They were both tall, narrow men in patched surface suits. One leaned against a tank on skids while the other held an herbal cigarette between the fingers of his pressure glove. A flexible smoking tube ran from the cigarette through a fitting in his helmet. He inhaled, detached the tube, and passed the cigarette to his partner with the solemn efficiency of men who had performed this ceremony too often to rush it.

The grave had just been completed.

Digging on Callisto was a word retained out of respect for tradition. No shovel could cut ancient water ice at minus one hundred degrees Celsius. The grave diggers drilled six narrow holes, pushed sticks of dynamite

into them, withdrew to a prudent distance and blasted open a cavity large enough to hold a body. A heated water tank would fill the hole after burial. The water would freeze around the deceased, sealing the grave more securely than concrete and preserving its occupant until geology, war or municipal rezoning decided otherwise.

Chunks of shattered ice littered the cemetery. The mourners stepped over them on the way to the grave. In Callisto's weak gravity, even a modest fragment could turn an ankle slowly enough for the victim to understand every stage of the mistake.

Father Lvis took his place at the head of the hole. He was drunk, of course.

His large black bouffant sat crooked inside his helmet, and his little Bible had been inserted upside down into the clip at his waist. He swayed despite the low gravity and gripped a grave marker whenever the horizon attempted to move. The only person who seemed not to notice was Bo.

Lvis had drunk himself to sleep the night before because he could not perform Ary's service sober. This was not because he did not care. It was because he did. He possessed great skill in concealing that side of himself and had spent years perfecting it.

"Dearly beloved," he began over the short-range radio, "we are gathered here today in the valley of the shadow of heartbreak hotel."

Nobody corrected him. "Our sister Ary has left the building. Maybe. The Lord giveth, the Lord taketh away, and the Quartermaster loses the receipt."

He stopped and stared at the wrapped body. For several seconds his voice did not come back. "She made papers," he finally said. "Good papers. Papers so good that a man could present them to Saint Peter and be admitted as his immediate supervisor."

A few people smiled. Lvis did not. "She made names for people who had been given numbers. That may be the closest any of us get to resurrection."

He looked down at his Bible as if surprised to find it upside down. He turned it over, opened it and read from a page containing a Titanian cigar advertisement that had been hidden between the verses. "Blessed are the forged, for they shall pass inspection." His voice cracked on the last word.

Oan stood at the edge of the grave. She was devastated. Her helmet hid her face but not the shaking of her shoulders. She clutched Ary's remaining hand through the burial wrapping and would not let go until Ricia gently separated her fingers one at a time.

That was when Bo understood who had been crying in the room beside his all night. The sound had not been plumbing, motel service, a power tool, or Father Lvis singing. It had been Oan. Quiet little Oan, who rarely spoke loudly enough for a helmet radio to notice, had wailed until the motel walls carried her grief into every room.

Bo looked away and realized Rbra had returned. She stood beside Serj near the back of the group. Dust covered her suit. A fresh burn marked one shoulder plate, and a strip of red cloth had been tied around her upper arm. She and Serj showed no affection. They did not touch or look at one another. They merely stood close enough that each would know if the other stopped breathing.

Bo should have been happy she was alive. He had imagined her dead so many times that seeing her alive ought to have filled him with relief. Instead he felt empty. The feeling was not painful. Pain had edges. This had none. It was simply a missing place inside him where something should have been.

He considered walking away. Beyond the cemetery, the white and black wilderness stretched toward Valhalla's next concentric ridge. He could step down the hill, cross the valley floor and keep going until his oxygen ran out. By the time anyone noticed, he would be out of radio range. Nobody would have to assign him anything. Nobody would have to explain what he remembered wrong. Nobody would have to die while standing near him.

Bo took one step toward the wilderness, paused, then he sat on a blasted chunk of ice instead. He rested his elbows on his knees and stared at his boots. The chunk was sharp and cold through the suit, but moving required a reason.

The others took turns speaking about Ary.

Ricia said Ary had once forged a prescription authorizing unlimited surgical alcohol and then used none of it herself because the spelling mistake offended her. They all knew it was a lie.

Ick said Ary could copy a vehicle registration seal by pressing it into a slice of bread. The crawler had been stopped three times with the bread still attached. Every inspector accepted it.

Etty said Ary changed her hair whenever she became frightened. Nobody had known this because Ary was frightened almost constantly and therefore appeared merely fashionable.

Moe said Ary once produced papers proving he had been born on Uranus. The documents were flawless except that she had listed his species as optional.

Arles said nothing for so long that everyone assumed he had finished. Then he announced that Ary owed him twelve credits and sat down.

Rothy read from a list. It began as an inventory of Ary's professional achievements and slowly became a catalog of private kindnesses: messages delivered, mistakes concealed, ration cards repaired, letters written for soldiers who could not write, names placed on forms that otherwise would have carried only numbers.

Serj spoke last. "Ary was good at what she did," he said. "Better than any of us deserved." He looked toward the grave diggers.

They did not move yet. They were waiting for the last speaker.

Everyone turned toward Bo.

Bo noticed only after the silence became uncomfortable. He looked behind him to see whom they were waiting for. There was nobody there.

He took a deep breath and stood up. His thoughts crowded together without forming a line. Some belonged to the morning. Some belonged to the station. Some may not have happened. He walked to the grave and looked at the white wrapping covered in Oan's colored stitches.

"Ary liked the truth," Bo began.

He stopped. That did not seem right.

"I mean, she liked hunting it down. About the Jokers. She thought they were real. Or maybe she thought they weren't real and wanted to prove they were. She told me one climbed out of the reactor. I kicked the reactor later, but that was a different thing."

Nobody interrupted him.

"She made me an ID card. Two of them. One said I was Lance Corporal Ben Ovaltine. The other said I was a major general."

Serj sad nothing.

Bo kept going. "She was supposed to throw that one away, but she didn't. It was really awesome. It had gold printing and everything. Granny

would've been proud, even if Granny isn't real. Ary didn't tell me Granny wasn't real. That was Arles."

Arles was testing the tensile strength of a piece of ice before sitting on it.

"Ary changed her hair all the time. Every hour, I think. Maybe not every hour. But every time I saw her it looked different. I liked that. It made her seem like a new person, except she was always Ary underneath."

Bo looked down into the blasted grave. "This world is going to be worse without her." His voice became smaller. "I wish the laser that hit her had hit me instead. I've still got lots of places it could make holes."

No one laughed.

Rbra lowered her head. Serj stared past the cemetery toward the ridges. Oan made a sound that the radio tried and failed to reduce to static.

Bo sat back down on his piece of ice.

The grave diggers lowered Ary into the cavity. Oan placed her sewing kit on top of the burial wrapping. Rothy added Ary's last blank identity card. Father Lvis removed the little Bible from his belt, considered it, then kept it. He placed the hidden cigar advertisement in the grave instead.

One of the Mooninites opened a valve on the heated tank. Water flowed through an insulated hose and into the hole. It steamed briefly in the vacuum, boiling at the surface while freezing beneath. White vapor drifted over the grave and fell as fine crystals around their boots. The clear water rose around Ary, turned cloudy, and became solid from the edges inward.

For a little while they could still see her beneath the ice. Then they could not. The grave digger closed the valve.

CHAPTER THIRTY-SEVEN BO BECOMES A SUBSTITUTE TEACHER

A week passed at the motel. This brought Bo to his first afternoon on Callisto.

Serj's good lead remained good, according to Serj. It simply refused to become realized.

Every morning he went into the village to meet a contact. Every afternoon he returned with a new reason the contact had not appeared. The contact's crawler had broken down. The contact's cousin had been arrested. The cousin's crawler had been arrested. Once the contact had forgotten which village they were meeting in and spent six hours waiting beside a laundromat three hundred kilometers away.

"These things take time," Serj said.

Nobody pointed out that time was one of the few supplies they possessed in abundance.

The motel had been run down for years. Even in its heyday, it had rarely attracted guests. The village stood far removed from military routes, commercial routes, pilgrimage routes and every place anyone wanted to visit. Its principal scenic attraction was a pressure regulator installed backward in 2651. Travelers only came to be photographed next to it.

The motel belonged to Utnam Ynch, a retired Jupiterian archaeologist and anthropologist who lived in a small underground home near the main agricultural dome.

Utnam was short, wide, elderly and almost entirely hidden behind a white beard that he parted in the middle to eat. He had spent most of his career studying Callistonians, publishing papers about their primitive customs, limited intellect and touching inability to appreciate how fortunate they were to be governed by Jupiter. He had privately liked the Callistonians much better than the people who funded his papers.

Years earlier, a wayward Vacuum Corps nuke had erased his archaeological camp one day before a letter arrived approving three additional months of funding. Utnam survived because he had left camp to complain about the price of coffee. Officially he remained dead, which simplified his retirement taxes.

Serj had traded with him before. Nobody explained what had been traded or which century the transaction occurred in. When Utnam

learned who was hiding in his motel, he allowed them to remain for free.

“I never made money from the place when it had employees,” he told Serj. “I see no reason to begin now.”

Bo met Utnam on the second day.

Utnam found him behind the motel attempting to teach a bicycle how to come when called. The bicycle belonged to no one Bo knew and demonstrated a level of independence common among local machinery.

“You’re the new one,” Utnam said.

“I’m three weeks old.”

“That is extremely new.”

“I might be older now. I got shot in the head.”

Utnam examined the repaired channel through Bo’s helmet and asked several questions. Bo answered all of them, including the ones Utnam had not intended to ask aloud. By the end of the conversation Utnam had learned that Bo could not read well, had received part of his education backward, believed Earth might be a moon of Uranus and had once been a major general on paper.

Utnam considered these prime qualifications.

“How would you like to teach school tomorrow?”

Bo stopped calling the bicycle. “I don't know anything.”

“That has never prevented anyone employed by Jupiter.”

The village elementary school occupied a low pressure dome beside the communal gardens. Its classrooms had been excavated into the ice beneath the dome, where steady temperatures and thick walls protected the children from radiation, war and educational reform.

Utnam escorted Bo there at 0830 the next morning.

The classroom contained sixteen Mooninite children seated at low tables. Even the youngest were long-limbed and narrow. Several were already taller than Bo when he sat. Their chairs were anchored to the floor, not because the children floated away in Callisto’s gravity, but because children everywhere discovered ways to weaponize movable furniture.

Pictures of crops, moons, pressure seals and famous Callistonian pacifists covered the walls. A blackboard stood at the front. Someone

had drawn a Jupiterian officer being eaten by a cabbage and labeled it FARTASTIC.

Utnam faced the class.

“Children, this is Sub Private Alpha Bo Bovastein of the Jupiter Vacuum Corps. He will be your substitute instructor today.”

Every hand went up.

“No questions for me,” Utnam said, with a chuckle. “Save them for the educational professional.” He left and shut the door.

Bo stared at the children.

The children stared at Bo.

One of them was the child who had ridden past the motel on a bicycle and waved. She sat near the middle, wearing a green sweater and an expression of delighted recognition.

“I know you,” Bo said.

“I know you too,” the child replied.

“Good. If I forget what I’m doing, tell me.”

All sixteen hands rose again.

Bo pointed to another girl in the front row.

“Why are you so wide?” she asked.

Bo looked down at himself. “So there’s more of me to shoot at.”

The children laughed.

He pointed to a boy at the next table.

“Are all Jupiterian soldiers stupid?”

“No. Some are officers.”

The laughter became louder.

Bo did not understand what he had said but felt encouraged.

“Were you grown in a jar?” another child asked.

“A mold. Jars are for babies.”

“How many people have you killed?”

Bo thought carefully. “None on purpose.”

“How many by accident?”

“I don’t know. Do vehicles count as people?”

The class discussed this among themselves and decided it depended on the vehicle.

The girl with a bicycle raised one long arm. “Are you going to teach us something or do we have to get rough with you?”

Bo turned toward the blackboard. A schedule had been written there in neat columns: MATHEMATICS, CALLISTONIAN HISTORY, AGRICULTURAL SCIENCE, LUNCH, PHYSICAL CULTURE.

He could read LUNCH.

“Yes,” Bo said. “Today I’m teaching lunch."

He began with the farms. “Lunch begins on a farm. I began on a farm on Io. Or at least I thought so." He went on to describe his memories of Granny's farm. Io had once been a farming community, he explained. Before the soldier factories, before the launch towers, before the government covered the old fields with vats and told everyone agriculture had been on big misunderstanding, families grew crops beneath reinforced domes.

Bo described Granny’s farm exactly as he remembered it: the barn with the loose roof panel, the potato fields, the paint sprayer, the rabid dog, the almanac on the kitchen table, and Granny herself waiting for him with food that his unfinished digestive system could not keep down.

The children listened more quietly.

“Did Granny have other children?” the bicycle girl asked.

Bo had never considered it. “Lots,” he said. “Foster kids.”

This was not part of his implanted memory. He made it up because it seemed appropriate.

“She took in every kid who needed somewhere to stay. She gave them beds in the barn and made them do chores and fed them pie. Sometimes the pie came back up, but that was probably just me.”

“How many foster children?”

“A hundred.”

The children looked impressed.

“Maybe two hundred during harvest.”

Bo drew the farm on the blackboard. The barn leaned hard to one side. The potatoes were larger than the house. Granny was a circle with six arms because Bo kept forgetting which lines belonged to her and which belonged to her giant wasp.

A girl corrected his spelling of Io.

Afterward the children told him about farming on Callisto. Their farms were underground, arranged in long galleries warmed by reactor waste and lit by reflected sunlight or electric lamps. Roots grew in trays of pulverized ice and mineral paste. Fungi climbed warm walls around power conduits. Water circulated through pipes, carrying dissolved nutrients from human waste, compost and algae tanks. Nothing was thrown away because everything had been hauled across space, grown with difficulty or eaten once already.

The children knew the flow rates of irrigation pumps, the carbon dioxide needs of local grain, the breeding cycle of tunnel rabbits, and three methods of treating fungal blight.

Bo knew none of these things but nodded as if examining them. “But what do you do when lava floods the farm?” he asked.

“There isn’t any lava on Callisto,” a child said.

Bo pointed he finger at her and said, “That’s what it wants you to think.”

“Ice doesn’t think.”

“Lava does. That’s why you read the almanac every year. It tells you when the lava floods are coming.”

“How can an almanac predict lava?”

“Old farmers put the dates in before they died.”

“How did they know?”

“They read an older almanac.”

The children laughed again. Bo waited for them to finish because he believed they had finally understood agriculture.

At lunch they ate vegetable paste, jerky and small blue cakes grown from reactor fungus. Bo checked every tube before opening it. None contained toothpaste, which he found disappointing.

The afternoon subject was physical education.

Bo led the class into the gymnasium, a long chamber carved into blue

ice. Padded mats covered the floor. Low-gravity climbing bars crossed the ceiling. The far wall displayed a stern warning against propelling classmates into ventilation equipment.

“Today,” Bo announced, “we’re learning wrestling.”

The children cheered.

Bo demonstrated a headlock on a padded training dummy. The dummy’s neck came off. He explained that this meant he had won. He showed them how to fall without striking the floor, which on Callisto involved waiting several seconds for the floor to arrive. He taught an elbow drop, a flying tackle and something he called the Ganymede Turnaround even though he had seen it only on television and could not remember how it ended.

The Mooninite children were extraordinarily good at wrestling. Their height gave them leverage. Their low mass made them easy to throw but difficult to keep on the ground. Within twenty minutes they were sailing across the gym in graceful arcs, colliding with padded walls and shouting FOR GRANNY without understanding why.

Bo had never been happier in a classroom.

During a break, the bicycle girl pointed at the patched spot in the back of Bo’s head. “Is that where you got shot?”

“Yep.”

“Did the laser go all the way through?”

“Yep.”

Every child gathered around. Bo sat down and parted his afro so they could all get a good look. The lasered channel entered at the rear of his skull and emerged above his left eye, where new tissue had formed a smooth pink ring. Ricia had warned him not to put anything inside it until the brain finished healing. She had been very specific.

A pencil lay on the teacher’s desk.

“Want to see something cool?” Bo asked.

The answer was unanimous.

Bo inserted the pencil into the opening above his eye. He pushed gently. The pencil traveled through the hollowed out channel in his skull and emerged at the back of his head. It did not enter his brain because the laser had cauterized a narrow tunnel and the suit’s emergency repair

system had sterilized it with sealant and a material normally used inside fuel hoses.

The class became silent.

Bo wiggled the pencil. At the same time the eraser moved behind his head.

The children erupted. They applauded, stamped their feet and demanded turns. Bo explained that they needed their own head holes. Several immediately asked whether the school drill could make them.

“No,” Bo said. “You have to earn one in battle.”

This was the first firm safety instruction he gave all day.

When Utnam returned at 1600, he found the children practicing low-gravity pile drivers while chanting about Granny. Bo stood at the front of the gym with a pencil through his head, drawing a map of Io on the blackboard by moving his entire body up and down.

Utnam watched until the bell rang and the children scattered like it was an air raid siren. He waddled up to Bo. “How did the lesson go?” he asked.

“They taught me humans first evolved on Callisto,” Bo said. He whacking the back of his head and the pencil when flying out. “I taught them everything else.”

The bicycle girl ran up to Utnam and tugged on his beard. “Can Mister Bo substitute tomorrow too?”

Utnam smiled, “Only if Mister Bo wants to keep sleeping without wearing his helmet.”

CHAPTER THIRTY-EIGHT TACTICAL DISADVANTAGE - BO FORGETS TO POOP

The next day at lunch, Bo developed a terrible pain in his belly. At first he assumed this meant he was hungry.

For breakfast he'd eaten a tube of potato flavored military ration #1 with extra Callistonian green sauce. The pain had started then but he ignored it. For lunch he ate half a blue fungus cake left over from the school cafeteria. The pain had moved upward and began kicking the inside of his ribs. Bo had interpreted this as evidence that the first two foods had not made friends yet.

By the time he opened a tube marked MEAT PRE-PRODUCT, he could no longer stand straight. He'd stumbled back to the motel and crawled through the airlock into the office.

Ricia found him bent over the motel's breakfast table with one arm wrapped around his stomach and a food pouch clenched between his teeth.

"What did you eat?" she asked.

"Lunch."

"Before lunch."

"Breakfast."

"Before that."

"Strawberry toothpaste."

Ricia closed her eyes. She led him through the motel office and into the back room she had converted into a medical bay. The room had once stored linens, replacement towels and several decades of unpaid bills. Ricia had cleared a space by tossing everything she did not care about into a busted shower stall then pulled the curtain closed.

A folding operating table occupied the center. Lamps had been bolted to the walls. Surgical tools boiled in a pot on a hot plate. A portable monitor rested on an overturned ice bucket. The room smelled of disinfectant, old carpet and whatever had lived in the towels when the motel had employees.

Ricia ordered Bo onto the table and opened the abdominal section of his mismatched suit.

She stared. “Have you been having trouble with your colostomy plug?”

“My what?”

Ricia looked him in the eyes. “The plug covering your intestinal port.”

“I got a plug?”

She pointed.

Bo leaned forward as far as his stomach allowed and inspected the small capped fitting above his hip. He remembered her removing his swollen colostomy bag at the ice station. He remembered her sealing the opening because they had no replacement bags. He did not remember anything after that involving the plug.

“You were supposed to remove it when you used the toilet,” Ricia said.

“How would that help?”

“It would permit waste to leave your body.”

Bo thought about this. “So where has it been going?”

Ricia pressed one gloved hand against his abdomen. Something inside made a sound like wet gravel settling in a barrel. “Nowhere.”

The food Bo had consumed during the previous weeks had moved through his unfinished digestive tract, reached the sealed exit and stopped. Each new meal compressed the meals before it. His abdomen had become a biological storage locker organized by chronological pressure.

Ricia consulted the glowing green monitor above his head. It displayed a two dimensional diagram of Bo's guts with a flashing X near the end. “Emergency surgery,” she said.

Bo sat up. “I can’t. I have school.”

“You have an intestinal obstruction.”

“I have to teach the kids the Ionian suplex.”

“Not today you’re not.”

Bo tried to climb off the table. A fresh wave of pain folded him in half and returned him to the mattress with professional efficiency.

Ricia shouted for Arles. The old reactor specialist entered wearing yellow-duck pajamas, one boot, and a welding mask. He dragged a green steel tank behind him on a hand cart. A faded radioactive symbol

covered its side. Beneath the symbol someone had written PARTY GAS in red pencil.

“Where did you get that?” Ricia asked.

“Reactor room.”

“Why was it in the reactor room?”

“Because I thought it looked cool in there.” He attached a rubber hose and mask to the tank. The mask had once belonged to a child’s toy spacesuit and covered only the center of Bo’s face.

“Breathe normally,” Ricia said.

“What’s normal?” Bo asked.

Arles opened the valve. The gas smelled like cinnamon and hot metal. Bo inhaled once. The room tilted. He inhaled again. Ricia acquired a purple outline. On the third breath Arles developed six heads, all of which smiled creepily at him.

“Is this safe?” Bo asked from very far away.

“Not really,” Arles replied.

Bo didn't hear the answer; he was falling upwards into the shadows. For a while he floated beneath the motel ceiling and watched the operation from outside himself.

He saw Ricia cut away part of his suit. He saw Arles hold a lamp and gradually forget why. He saw the surgical tools arrange themselves into a marching band. The forceps played trumpet. The scalpel conducted. The pot of boiling instruments sang the Jupiterian anthem backward at half speed.

Then Serj came into the room. Moe and Rbra followed him. They stood around the makeshift operating table and looked down at Bo as if he were dead.

Both of the glasses in Moe's shades were shattered now. He removed them and shook his head. “Damn,” Moe said, “Not they way I'd want to go."

“He's only a month old,” Rbra replied. “He has no idea what's he's going to miss out on.”

Serj removed his cigar and studied Bo through the smoke. “What are we going to do with the body? I'm not giving any more dynamite to those dank Mooninities.”

Bo wanted to tell them he was not dead yet. He wanted to tell them that Mooninites weren't dank. He tried to move his mouth. His mouth was no longer attached to his face. He tried to lift one hand, but the hand floated away and began waving from the corner of the room.

Rbra leaned over him. “We should trade him,” she said.

“For what?” Moe asked.

“A used crawler.”

“We’d have to throw in the cigar case.”

Serj shook his head. “I don’t think so.”

Bo tried harder to speak. I’m not dead, he thought. Nobody heard him. Not dead yet.

The words appeared in the air as large yellow letters. They drifted toward the ceiling, bumped into one another and hatched into butterflies wearing Granny's face.

The room dissolved. Colors spun around him in enormous rings: red, green, violet and a shade of orange used only for Jupiterian skin and luxury furniture. The rings widened into tunnels. Granny stood at the far end holding a pie. Ary stood beside her changing her hair faster than Bo could name the colors. A Joker climbed out of the pie and asked to see his papers.

Bo produced his major general identification. The Joker saluted. Granny opened the barn door. Behind it lay Earth, covered in blue oceans. Giant sea monsters wrestled thinking machines along a beach while Saturnians in French uniforms redistributed lightning to the poor.

“You gonna poop or sit on the can all day?” Granny asked.

Bo decided to go with it. He pushed away from the operating table, the motel, Callisto, and the whole diseased machinery of the Jupiterian system. He drifted into the dark colors, and they wound around him like warm, foul-smelling ribbons. For a moment they carried him gently. Then they tightened and began hauling him back toward that frozen moon of hell: back to pain, coffee, dirty rifles, and officers demanding to know which direction he had been shooting at people. Bo became furious. Being dragged back from the infinite was the sort of thing that happened to smart people. People who cared about things and knew why.

Then, somewhere far below his floating consciousness, his intestines

released. The pressure vanished. The ribbons let go. Relieved of a burden he had carried for longer than he could remember, Bo sailed freely into the cosmos while the universe flushed behind him.

When Bo finally woke, the back room was quiet. He laid naked on the folding table. His suit had been removed and placed in pieces across two chairs. Fresh bandages wrapped his abdomen and lower back. Something unfamiliar ached beneath them with the shy discomfort of new construction.

Ricia sat in the corner reading an old magazine. The cover showed a wealthy Jupiterian woman before and after cosmetic body widening. The headline promised FOURTEEN INCHES OF PURE BLISS IN ONE AFTERNOON. Ricia turned a page showing fashionable replacement chins for admiralty wives.

Bo watched her for several seconds. “What did I miss?” he asked.

Ricia looked over the magazine. “Three arguments, a plumbing emergency, and Arles trying to put the obstruction in a specimen jar.”

“Did I die?”

“Ask me again tomorrow.”

Bo raised his head. “Where’s Serj?”

“Trying to find out why his lead was moved to another village.”

“Moe?”

“Looking for a new pair of sunglasses.”

Bo decided to ask Moe for his old pair the next time he saw him. Then his mind turned to someone else. “Rbra?”

“Threatening Utnam on your behalf.”

Bo relaxed.

Ricia closed the magazine and rolled her chair beside the table. “Now, “ she said patting his on the shoulder in a very motherly way. “We need to discuss hygiene.”

“Is that a weapon?”

“You must take off your spacesuit at least twice a week.”

Bo looked at the pieces on the chairs. “All of it?”

“All of it. And you need to shower. Preferably more often than twice a week.”

“I taught the kids how to shoot me with squirt guns.”

“That was not a shower.”

She explained that sealed combat suits were designed for temporary battlefield use, not continuous habitation. Their environmental systems removed sweat and moisture but did not remove skin oils, dead cells, bacteria, fungal spores, food paste or the various substances Bo encountered while lying face down on Callisto.

Weeks without fresh air had turned several folds of his skin into independent ecosystems.

“You had three previously unknown forms of fungus growing on you,” Ricia said. “One reacted to light. One reacted to sound. The third reacted to Father Lvis.”

“Did you kill them?”

“The first two. The third escaped under the office door.”

Bo's eyes darted to the door.

“The important thing,” Ricia continued, “is that the operation succeeded. I also managed to finish the lower part of your digestive tract and installed a functional anal opening.”

Bo stared at her. “A new, uh butt hole?”

“Yes.”

He considered the strategic consequences. “So what you’re telling me is… now I have to sit down to poop?”

“That is generally how it works.”

Bo laid back down. “There goes my tactical advantage.”

Ricia reopened her magazine. She did not have the heart to tell him what color it was.

CHAPTER THIRTY-NINE THE BIG ONE - DINNER AT UTNAMS

The next day Bo recovered enough to return to school.

Ricia described him as ninety-nine percent operational. She refused to identify the missing one percent or say whether it had ever been installed.

Bo spent the morning teaching the children the suplex, which he now pronounced correctly but demonstrated incorrectly. The class spent the afternoon writing essays about Io's imaginary foster-child harvest. Three students included diagrams of Granny fighting lava with a shovel. One argued convincingly that Granny caused the eruptions.

At the end of the day Utnam invited the entire squad to dinner.

His house stood adjacent the village's largest agricultural dome. It was a low circular structure built into the side of the main dome, with walls of blue ice behind shelves of archaeological debris. Ancient fragments of radiation shielding shared space with old pressure valves, fossilized algae cakes, military shell casings, and one complete prehistoric toaster that Utnam insisted had ceremonial significance.

The dining room had been designed for Jupiterians. Its ceiling was low, its table was broad, and its chairs too short. Bo and the other vat soldiers had to arrange themselves around the table on their knees. Utnam sat comfortably at the head, almost entirely concealed by his white beard and a napkin tucked into it.

Moe cooked dinner in the adjoining kitchen from local ingredients. He made a thick stew from unknown-tunnel-animal meat, root vegetables, reactor fungus, blue grain and several chili peppers grown in a hydroponic gallery beneath the school. Biscuits emerged from the oven in hard little disks. A salad of translucent leaves attempted to crawl out of its bowl whenever exposed to light.

Moe added spices until the steam made everyone's eyes water from across the room.

"That's enough," Ricia told him.

Moe added another handful. "Now it is."

They packed around the table: Serj, Rbra, Moe, Ricia, Etty, Arles, Lvis, Rothy, Ick, Oan, the remaining smugglers, Bo, and Utnam. Ary's absence

occupied a place no chair (or knees) could fill. Oan sat beside the empty section of table and kept her hands folded in her lap.

Utnam raised a glass of pale green liquor. “To survival,” he said. “The least dignified of all achievements and the only one with repeat customers.”

They drank.

Bo drank water because Ricia had forbidden alcohol until his new digestive system passed its first field test.

Moe ladled stew into ceramic bowls adorned with children's art work.

Bo took one bite. The food burned his tongue and froze it at the same time. He dropped his spoon. His eyes watered. Cold rushed up the roof of his mouth while heat spread down his throat. He inhaled to cool it and discovered that breathing made both sensations stronger. “How can it be hot and cold?” he demanded.

Moe pointed his spoon toward the chili peppers. “Those activate the heat receptors.” Then he pointed toward pale blue flakes floating in the broth. “Those activate the cold receptors.”

The stew itself was only warm. The nervous system supplied the rest.

“Your mouth isn’t a thermometer,” Utnam explained. “It is a collection of unreliable witnesses. Unreliable witnesses are my specialty.”

Bo took another bite to see if they changed their testimony. They did not.

“Go easy, Bo.” Ricia warned, “Pun intended.”

Bo scooped up a larger spoonful. “Don’t worry. The doc says my new butt can handle it.”

The table became quiet.

Ricia snickered. “It’s a medical thing.”

Utnam parted his beard. “I believe I missed some of that medical history.”

“Consider yourself fortunate,” Ricia said.

Moe returned to the stove for more stew. Father Lvis blessed the biscuits individually, possibly to soften them. Ick tried feeding a translucent salad leaf to Arles. The leaf recoiled.

For several minutes dinner became almost normal. Then Serj tapped his glass with the handle of a knife. “I have an announcement.”

Every head turned.

Serj stood. The low ceiling forced him to remain bent at the neck, which made the announcement appear confidential even before he spoke. “The deal is on.”

Moe stopped beside the stove. Rbra’s posture changed. Etty set down her fork. Rothy pulled a notebook from inside her jacket so quickly that Bo suspected she kept one near every organ.

“What is it this time?” Rothy asked, unimpressed.

“I've been able to contact a private Jupiterian collector operating here on Callisto, not far from here. He's a private collection. Very private. And he's offered us a cash reward for a specific artifact.”

Bo raised his hand.

Serj ignored him.

Bo kept it raised.

“What?” Serj finally answered.

“Why does he collect privates?”

Rbra spoke up before anyone else had a chance to correct Bo. “His collection is private. He doesn't collect privates.”

Utnam chuckled. “I think what our friend here is asking is what are artifacts. Now that is a very interesting question. The answer to which I have spent a great deal of my life answering.”

Bo raised his hand again. “An artifact is ancient doo-dad from back when everyone was a Mooninite and nobody lived on Jupiter.”

“From the mouth of babes,” Utnam said, his eye twinkled as he gazed fondly upon Bo.

“So it’s true.”

Utnam took a long drink. “Naturally.”

Arles tore a biscuit in half with both hands. “So what does this private collector want? Hopefully something we can boost of the walls of this place.”

Serj looked toward Utnam before answering. “I think our host here might object to that.”

“You never know,” Moe said.

Serj turned to Moe. “All I can say right now is that I know where it's at. And it's close.”

That brought the room quiet again.

Serj explained that the object had been sitting in one of his caches for years. He had acquired it as part of a mixed shipment whose manifest described the contents as damaged agricultural fittings, obsolete religious equipment and one box not to be opened near magnets. He had never known the artifact was valuable. He had never known it was an artifact.

“Which cache?” Rbra asked.

“The old fuel shelter north of here. About thirty clicks.”

“That cache is still there?”

“Probably.”

Moe returned to the table. “So what’s the plan?”

“Tomorrow morning I take you, Rbra, and Bo to retrieve it.”

Bo stopped chewing. “Me?”

“You. I need my good little luck charm.”

Bo swallowed too quickly, coughed a piece of tunnel-meat across the table and raised both fists in triumph. He had finally been chosen for a mission. “Whoopie!” he cheered.

Everyone at the table Bo was cheering to the fact that he'd managed not to choke to death. But Bo was thinking something more personal. That fact that he'd been chosen, not by mistake, not because he failed to leave a vehicle. Not kicked out of a drop ship because everyone else was busy. Serj had said his name before departure and everything. “I’m ready,” Bo said.

“You’re ninety-nine percent,” Ricia corrected.

“I’ll use the toilet paper. I promise.”

“Please do.”

Rothy turned to a fresh page. “When is the handoff?”

“Tomorrow night. Automated weather station, five clicks up the north road.”

He explained that Utnam had selected the location. The station stood by

itself on a flat plain beyond the village ridges. It consisted of a mast, sensor dishes, instrument boxes and an emergency pressure hut intended for technicians who no longer visited. There was no cover within several hundred meters.

“Out in the open,” Serj said. “Hard place to set up an ambush without somebody seeing it.”

“Also a hard place to survive one,” Etty said.

“That’s why everybody has an assignment.” Serj used spoons, bowls and the escaping salad to lay out the terrain on Utnam’s table. He placed the stew pot in the center. “Weather station.”

A biscuit went on the far side. “Etty and Arles take the ridge overlooking it. Eyes and ears. Rifles if needed.”

Etty nodded.

Arles picked up the biscuit and bit it.

Serj replaced it with another. He set three spoons beside the stew pot. “Moe, Bo, and I ride out in the used buggy and make the trade.”

“I get a spoon,” Bo said.

“That one is Moe.” Serj placed a bent fork farther around the table. “Rbra, Lvis, Rothy, and Ick wait over the hill on the opposite side with motorcycles. If the buggy fails, the buyer turns unfriendly, or Jupiterian patrols appear, they are the escape plan.”

“Where am I?” Rbra asked.

Serj found a steak knife and laid it beside the fork.

She accepted this.

He continued explaining that the morning team and the handoff team were not the same. Rbra would help retrieve the object from the cache, inspect it, then join the motorcycle group before the nighttime exchange. Nobody trusted Bo to inspect it and nobody trusted Moe to leave it alone.

“You expect something fishy?” Moe asked.

“No,” Serj said. “But for this kind of score I’m not taking chances.”

“What kind of score is that?” Rbra asked. “Enough for a new base and equipment?”

Serj smiled. “Think bigger..”

Nobody moved.

“Forget hidden bivouacs and way-stations with second hand outdated equipment,” he said. “This is the big one. Ten million credits in cash and casino chips.”

The amount traveled around the table more slowly than sound. Ten million credits could purchase a base, vehicles, forged identities, weapons, medical equipment and passage off Callisto. The casino chips were less useful but considerably harder for the Jupiterian government to trace.

Moe sat down. Rothy stopped writing. Oan looked up for the first time during dinner.

Bo tried to imagine ten million credits. How big were they? Could he even fit one in his pocket? The largest amount of money he had ever possessed was eight credits, which he lost gambling against a vending machine.

Arles looked across the table at their host. “How do we know we can trust him? This collector.” he said. “Could be a trap. That crazy third lieutenant's still out there looking for us, you know.”

Utnam continued eating.

Serj walked behind the old archaeologist and placed a hand on his broad shoulder. “Utnam wouldn't betray us.”

Arles narrowed his eyes.

“Utnam made the deal with the buyer for us,” Serj explained, “I've been doing deals with him for years, not this big, but still. If he was going to betray us he would have don't it along time ago. I trust him with my life.”

Utnam wiped his beard with the napkin tucked into it. Most of the napkin disappeared and did not return. He lifted his glass. “To enterprise,” he said, “historical preservation, plausible deniability and my ten-percent commission.”

The squad raised their glasses.

Something clicked inside of Arles head, he smiled and raised his glass with the others.

Bo raised his glass upside down.

CHAPTER FORTY CLEARN UP ON AISLE 3 - SERJ MEETS AN OLD FRIEND

The next morning began with a shopping trip. It was morning for humans, anyway. On Callisto it was hour 297 of the four-hundred-hour day, almost sunset, while the soldiers' clocks insisted it was 0800. The military had brought its own notions of time from Jupiter and saw no reason to adjust them for local astronomy. Outside the motel, the sun hung low above the ridges of Valhalla and cast Bo, Moe, Arles, and Serj into long black shapes across the ice. Their shadows preceded them all the way to the convenience store, arriving several seconds before they did and looking considerably more organized.

Bo, Moe, Arles, and Serj stopped at the village convenience store before driving north to retrieve the artifact. Their used buggy waited in the parking area with its reactor ticking, its right front suspension sagging and a fresh coat of white paint concealing three older coats of military green.

Serj gave them ten minutes. “Supplies only,” he said. “Snacks, ammo, batteries. This isn't a school field trip. Keep your helmets on.”

“Candy?” Bo asked.

“No.”

“But candy is one of the food pyramids. After bags of stuff, cans of stuff and boxes of stuff.”

“Not today.”

The store stood beneath its own pressure dome. Inside, narrow aisles curved around a central support column. Shelves rose half the way to the transparent roof because Callistonians could reach them without ladders. Every product carried three prices: local currency, Jupiterian credits and time barter.

Bo entered the ammunition aisle first. Boxes of laser cartridges filled both walls. Civilian rounds occupied the lower shelves. Military surplus sat higher up, still bearing warning labels, inventory numbers and occasional dried blood. A locked display case offered premium ruby-ended bullets guaranteed to emit a redder beam for ceremonial executions.

Bo did not know which cartridges fit his rifle so he took some of each.

He filled a wire basket with boxes marked RIFLE, PISTOL, HEAVY RIFLE, LIGHT ARTILLERY, FLARE, PRACTICE, REJECT and ROULETTE. One package contained conventional gunpowder bullets intended for antique collectors. Bo included those because they looked cool.

He had no idea how much any of it cost. That did not matter. By tomorrow they would be filthy rich.

Bo wondered whether being filthy rich required additional showers. Ricia had already ordered him to take off his suit twice a week. Wealth might increase the requirement. Jupiterian officers looked shiny in propaganda films and Bo had never considered the labor involved.

At the end of the ammunition aisle he discovered candy. An entire glorious aisle of it.

Mooninite candy came in transparent tubes, compressed bricks or self-warming chewing resin. Bright wrappers promised flavors including dingleberry, lunar lime, hot ice, salted vacuum, game and mystery isotope.

Bo began to drool. The drool reached his lower lip before the suit's hygiene monitor detected it and started two suction pumps. He licked his lips then flipped his visor up so he could sniff the ones that called to him.

Unbeknownst to anyone inside the store, a Vacuum Corps crawler had entered the village moment before. It was not hunting smugglers. It was not conducting a raid. It had simply made a wrong turn.

The crawler belonged to a shift-change detail traveling between two Jupiterian outposts. Somewhere beyond the Valhalla ridge, its navigator had mistaken a sewage-pressure line on the map for a military road. The driver followed it for forty kilometers before the line ended at the village water-treatment dome.

Two Vacuum Corps NCOs rode in the enclosed cab. A squad of twelve experienced soldiers occupied the open cargo bed behind them. They had been on duty for eighteen hours, off course for three and certain of their location for none.

The senior NCO decided to stop for snacks while the junior NCO consulted the maps.

The twelve soldiers remained in the crawler. Their sun-visors were up and their rifles rested between their boots. The store was visible ten

yards away through the parking lot. Nothing appeared threatening. A faded sign advertised moon-milk biscuits. The village traffic consisted of two bicycles and a manure sled.

The NCOs went inside. The senior NOC stopped to flip open his inner visor. He took a deep breath and immediately started coughing. “Mooninites!” he gasped and flipped it back down.

Serj noticed them too late. He stood near the front counter arguing with the clerk over the exchange rate for batteries when the airlock cycled behind him. Two Vacuum Corps sergeants entered wearing regulation combat suits and unit markings bright enough to read from the next aisle.

Serj stopped talking. Moe saw his expression from the canned-meat display. Arles was somewhere near household chemicals, looking for dynamite or an acceptable substitute while Bo remained one aisle over, transfixed by candy.

Serj crossed to Moe without appearing to hurry. He flipped up his visor and whispered, “Act normal. They won’t even notice us.”

“Won't notice who?” Bo asked, over the close range comm channel.

“Shhhh.”

They separated. Moe slinked toward the refrigerated cases with a packet of fried hide chips held in front of his face. Bo pushed his basket into the candy aisle and attempted to look like an ordinary six-foot-four armed soldier purchasing enough ammunition to defend a small nation.

Serj turned toward the back of the store. He had nearly reached the storeroom door when one of the NCOs rounded the corner.

The NCO was a broad white sergeant with a scratched helmet and the name RILEY painted over one shoulder. He saw Serj, paused, and broke into a grin. “Oger?”

Serj considered pretending to be another six-foot-four tan NCO with the same face. He noticed the NCO had his visor down and quickly did likewise. “Riley,” he said warmly.

Riley slapped him on the shoulder. “What the hell are you doing way out here?” His nasally voice echoed inside Serj’s helmet.

“Oh, hey, Riley. I haven’t seen you since that revolt on Ganymede back in seventeen.”

“Small universe.”

“Keeps getting smaller.”

Riley looked him over. Serj’s suit carried no current unit patches, no fresh inspection marks and a repaired tear across the chest shaped like a customs officer’s hand. “What are you doing on Callisto?” Riley asked.

“Messenger duty. Delivering reports back and forth for Camp Rag.”

“Sounds about right,” Riley chuckled. He stopped and looked Serj directly in the eye. “Wait. Where did you say?”

“Camp Ragnarok. You know. Giant ice spire.”

Riley’s smile remained in place, but something behind it stopped smiling. “How long have you been away from your post?”

Serj realized he had said something he should not have said. He could not remember precisely why, which made the error worse. “Two days.”

Riley leaned closer. “You sure about that, buddy?”

Better play stupid. “Yep. Left Camp Aldar Rok two days ago.” He emphasized the name of the camp this time.

“Aldar Rok?”

“That’s right.”

“You said Ragnarok.”

“Did I?” Serj smiled. “Silly me. Used to work there a long time ago. I get the names mixed up sometimes.”

Riley studied him closely now. “That’s one hell of a mix-up.”

“Lot of camps. Lot of rocks.”

“Ragnarok was taken by the Saturnians ten years ago. We’ve been fighting to take it back this whole time.”

Serj’s smile did not move. “Yep.”

Riley’s hand drifted toward his sidearm. “Who’s your commanding officer over at Aldar Rok? I’ve got some buddies there myself. Maybe you know them.”

Serj knew his cover was gone. He also knew Riley had not drawn his weapon yet. Between those facts lay a narrow strip of possibility, and Serj had made a career of living on narrower ones.

“You remember Captain…?” he began.

From the other side of the store, the second NCO shouted. “SATURNIAN!” followed by the sound of a rifle being fired. The sound traveled through the air of the store and reverberated into his helmet.

A red laser beam crossed three aisles in a straight line, cut through a display of canned vegetables, melted the handle off a shopping basket and burst a rack of frozen drink pouches. Steam, syrup and shredded labels filled the air.

No one could see what or who had had fired or at what exactly.

Serj stopped bluffing. He drove one fist into Riley’s abdomen. The combat suit absorbed most of the blow, but Riley folded just far enough for Serj to shoulder past him and run.

More shots reached the helmets of the twelve soldiers outside as an audio alert before the light had faded from the store windows.

Their training took over. Helmet HUDs came to life. Rifle safeties released. The cargo gate slammed open. Twelve experienced soldiers jumped from the crawler, formed two assault lines and charged the airlock without waiting to discover whether the enemy existed.

Inside, alarms began to shriek. Pressure shutters dropped over the windows. The store clerk disappeared beneath the counter. The central lighting changed from white to red, then to green, then shut off completely because no one had serviced the emergency system since the revolts of 2717.

Serj ran toward the rear storeroom. He had no idea where Moe, Bo, or Arles were. The aisles, steam and stacked merchandise blocked every line of sight. Radio channels filled with store alarms, Vacuum Corps commands, somebody screaming about prices and Bo wondering aloud if he was permitted to talk yet.

The standing order was to rally behind the school if anything happened and they became separated. He reached the storeroom door just as Riley recovered behind him.

Outside, the first six troops entered the airlock. The chamber could hold only four. All six attempted it anyway. The outer hatch protested, closed on a rifle barrel, reopened and briefly exposed the store entrance to vacuum. Packages lifted from the shelves. Candy spheres poured from their tubes and formed tiny tornadoes. The clerk rose halfway from behind the counter, saw the weather forming inside his store and went back down.

The inner hatch opened. Less than fifteen seconds after the first shot, twelve Vacuum Corps soldiers stormed the convenience store with helmets sealed and rifles blazing.

Laser fire crossed between the aisles. Shelves erupted. Ammunition boxes cooked off in isolated red flashes. A display refrigerator vented white vapor. The pressure dome above the store automatically polarized until the outside world could see only strobing red light beneath dark glass.

From the village street, the convenience store appeared to become one contained battle zone. Back at the motel, cups trembled on the breakfast-room tables. The vibration traveled through the buried pressure foundations and into the ice. Rothy looked up from her radio. Rbra stopped tightening a motorcycle fuel coupling.

A second vibration followed. Then several close together.

Together they crossed to the motel window. Down the street, laser flashes pulsed inside the convenience-store dome. The entrance airlock opened and closed repeatedly around running figures. Something struck the top of the dome from inside and sent a spray of sparks across the transparent surface.

Rothy listened to the military channel for three seconds. “Things have gone south.”

Rbra was already reaching for her helmet.

“Plan B?” Rothy asked.

Rbra nodded.

CHAPTER FORTY-ONE WE HAVE THEM - THIRD LIEUTENANT CLOSES IN

The third lieutenant was twelve clicks away when his second-in-command picked up the chatter on the radio.

At first it was only noise: overlapping rifle reports, pressure alarms, half a dozen soldiers shouting contradictory directions and a store clerk demanding that somebody pay for the canned vegetables. The lieutenant's convoy continued south along the groove road while his second-in-command turned the receiver dial with one gloved hand.

Then a name broke through the static. A specific sergeant’s name that was synonymous with smuggling. The soldier who Bo called Serj.

The second-in-command patched the audio into the lieutenant's helmet. He listened for two seconds. That was enough. He raised his fist. The little convoy stopped so abruptly that two motorcycles bumped into the rear buggy and one sidecar gunner swallowed his chewing tobacco.

“Turn around,” the lieutenant ordered.

No one asked why. His men had learned that questions delayed answers and answers usually hurt.

The lead buggy swung wide across the road. The others followed, scraping fenders and throwing black regolith against the ice banks. Motorcycles circled through the gaps. Heavy sidecars bounced behind them, their gunners clinging to handles welded there after the original handles had fallen off.

The reconstituted Smuggling Enforcement Unit now consisted of four heavy buggies and ten motorcycles. Five motorcycles carried sidecars mounting heavy laser rifles. The other five carried extra ammunition, spare oxygen and men who had been told they were scouts because nobody wanted to call them expendable in writing.

It was not the same unit the lieutenant had started with. Most of that unit was scattered along the bottom of a crevasse, distributed through several buggy wrecks or officially listed as temporarily misplaced. These replacements were loyal, experienced and frightened enough to follow orders quickly.

The lieutenant preferred frightened men. Ambitious men eventually wanted his chair. Brave men eventually questioned his plans. Frightened men wanted only to be told where safety was. Frightened men still had a

tiny glimmer of hope in their eyes.

He pointed back toward the village. “We have them now.”

Engines revved. Tracks bit into the ice. The convoy accelerated north.

High above them, the same radio chatter climbed through a relay balloon, bounced off a reconnaissance satellite entered the carrier CVBN-66743 Arley Mith through an antenna that had not been inspected in fourteen years and arrived at Command Intelligence as a report of a fresh Saturnian incursion.

The report identified the location as a sleepy Mooninite village no one aboard had ever heard of. That made it important.

Unknown villages were where enemies built secret bases. Unknown villages were also where the Jupiterian military misplaced its own bases, but Command Intelligence ranked that possibility below sabotage, invasion and spelling error.

The report moved upward through seven officers in forty-three seconds. Each added certainty while removing detail. A firefight inside a convenience store became enemy small-arms activity. Enemy small-arms activity became a coordinated Saturnian landing. The coordinated landing became a possible strategic assault on the Outer Valhalla Defensive Zone, a zone invented by the sixth officer so his report would have somewhere respectable to occur.

The seventh officer carried it to Lieutenant Colonel Atton.

Atton was eating breakfast in the officers' observation lounge. Callisto rolled beneath the windows while his eggs remained attached to the plate greased with an oil approved for both food service and engine repair.

He read the first three lines. “How many Saturnians?” he asked.

“Unknown, sir.”

“Unknown is usually a lot.”

“Yes, sir. Probably millions.”

Atton pushed the eggs aside and examined the tactical display. The village appeared as a dot with no label. One red enemy symbol pulsed over it because the computer would not display an incursion without at least one enemy. The symbol was four kilometers wide.

“What reserves are ready?”

“None, sir.”

Atton looked up.

The intelligence officer corrected himself. “One brigade is recovering from being thawed yesterday, another can be ready after thawing today.”

“Thaw them.”

“What about the first brigade?”

Atton looked again at the red symbol. It seemed to pulse more aggressively when questioned. “Thaw them both. Immediate deployment, lieutenant.”

The order entered the carrier's reserve system. Ten decks below, warning lights flashed along two refrigerated troop vaults. Pumps forced warm nutrient fluid through thousands of storage cradles. Frost broke from armor. Hearts that had been beating once every eleven minutes accelerated to wartime rates. Soldiers opened their eyes into bright lamps while prerecorded sergeants told them they were rested, informed, and eager. The first brigade that had already been thawed the day before was made to suffer through the procedure a second time.

The second brigade had been frozen before the Arley Mith left Jupiter. Its soldiers believed they were still in low orbit and that lunch would be served in an hour. The first brigade had been thawed and refrozen twice because of paperwork errors. Being thawed three times for only two freezing complicated things. Several members remembered portions of deployments that had never occurred. One remembered being in a refrigerator.

There was no time to correct them. With frost still on their eyebrows, armor racks clamped suits around bodies. Rifles were issued by caliber where possible and color where not. Drop-ship assignments appeared on overhead boards. Eight thousand reserve soldiers stumbled and shivered toward the deployment ring while medical orderlies sprayed stimulants into any soldier that slowed down.

The official objective was transmitted to every squad: CONTAIN AND DESTROY SATURNIAN INCURSION.

The village name was omitted because no one could pronounce it.

On Callisto, the third lieutenant's convoy covered the twelve clicks in fifteen minutes.

He entered the village from the north, near the dilapidated motel. The

pressure domes rose from the ice like bubbles frozen halfway through a boil. Empty bicycles leaned against railings. Curtains twitched in windows and went still. The gravel street ahead ran straight toward the flashing convenience store.

The lieutenant saw red laser light flickering under the store dome and felt something close to happiness. “Seal the north road,” he ordered. “No one leaves.”

Two motorcycles peeled away behind him. The remaining vehicles tightened formation. His lead buggy rolled past the motel parking lot at ten kilometers per hour. The second buggy followed close enough to use the first for cover. Sidecar guns tracked the windows on both sides of the street.

The village looked deserted but it was not.

The first rocket-propelled grenade came from the direction of the barber shop. Callisto's thin exterior atmosphere could not support a conventional rocket well, but the grenade had been designed by someone who distrusted gas based atmospheres. Its motor burned its own oxidizer. It crossed the street trailing a narrow white line and struck the lead buggy below the forward axle.

The explosion lifted the vehicle sideways. For an instant the buggy traveled on two wheels. Then the front suspension tore free, the reactor shield split and the whole machine rolled into the front airlock of the post office. The lock burst inward. Mail, steam and one startled postal clerk fled the lobby.

A second grenade came from the opposite side of the street and it struck a sidecar.

The gunner, the gun and most of the sidecar vanished in different directions. The motorcycle continued upright for another thirty meters because its driver had not yet noticed the change in weight.

Laser fire opened from both sides. Red beams struck armor, storefronts, road signs and the pressure domes overhead. Each beam lasted only a fraction of a second, but persistence of vision connected them into a glowing cage. The lieutenant's men fired back at windows without knowing which windows had fired first.

“Who's shooting at us?” someone demanded on the command channel. “Saturnians or smugglers?”

“I don’t know. They look just like us,” came the reply.

The speaker exploded before identifying who looked like whom. His radio remained open. For several seconds it transmitted the hiss of leaking oxygen and a distant advertisement from the convenience store public-address system: BUY TWO MEAT PLANKS, RECEIVE THE THIRD AT HALF PRICE.

The third lieutenant was no longer in the lead buggy because the lead buggy was burning inside the post office.

He had been riding in the second vehicle, as required by a personal regulation he had written after the last time the first vehicle exploded. He climbed through the roof hatch and surveyed the street.

The ambush had been prepared quickly but intelligently. Rifles occupied upper windows. Grenade teams fired from ground-level airlocks and withdrew before return fire arrived. The attackers wore Jupiterian combat suits, Mooninite festival robes or out dated pieces of both. Some had regulation rifles. Others carried Saturnian weapons. One fired a mining drill.

They could have been smugglers, locals, Saturnians, deserters or all four in a cooperative arrangement.

The lieutenant did not need to know. Classification was for reports. Survival required direction. “Split the unit,” he ordered. “Second and third buggies hold this intersection. Six motorcycles with them. Suppress both sides.”

“And you?” his second-in-command asked.

The lieutenant dropped into the driver's position of his buggy and shoved the previous driver toward the passenger side. “I'm taking the store.”

He selected two motorcycles with heavy sidecars and pointed down the street. “In front of me,” he ordered.

The motorcycle crews hesitated.

“You're screening the command vehicle,” he explained.

They understood the sentence. They also understood what a screen was expected to catch.

The lieutenant gunned the buggy before they could develop a philosophical objection.

The two motorcycles surged ahead, one on each side. Their gunners opened fire continuously at the buildings. The heavy rifles threw red

bars through windows and peeled long glowing scars across the pressure walls. Yellow foam oozed out of the holes sealing the leaks. Return fire converged on them at once.

The buggy followed between the motorcycles.

Behind him, the rest of the enforcement unit stopped and turned broadside across the street. Sidecar weapons hammered the ambush positions. A buggy missile struck the barber shop and converted hair clippings stored since 2698 into a brief glitter party. Another missile demolished the village historical society, destroying three centuries of records and temporarily improving its heating system.

The lieutenant accelerated. The first motorcycle to his right took a rifle beam through its front reactor. The machine disappeared beneath the buggy's left side. The lieutenant felt two impacts under the tracks and corrected his steering without looking back.

The second motorcycle lasted four seconds longer. Its gunner was hit first. The driver kept the machine straight, either from discipline or because his steering linkage had melted. A grenade detonated beneath the sidecar. The blast pushed the motorcycle ahead like a kicked toy and cleared the intersection before it came apart.

That was enough. The lieutenant's buggy shot through the opening behind it. Storefronts streaked past on either side. Laser fire followed, glanced from the rear armor and cut the spare-oxygen rack loose. Cylinders bounced across the street, hissing and spinning.

The convenience-store dome grew larger ahead.

Inside it, rifles flashed through smoke and flying merchandise. Figures ran between the aisles. The lieutenant could not identify Serj among them, but he did not need to. The exits were few. The village was surrounded by ice boulders. Reinforcements were available by radio whether officially assigned to him or not.

He leaned over the controls and smiled for the first time since warrant officer school.

Above the village, still invisible against the black sky, the first wave of reserve drop ships separated from the Arley Mith.

There were enough soldiers descending to capture the village three hundred times over before that was realized to be an undercount.

No one had told them that Jupiterians were already shooting Jupiterians on every street below. No one had told the lieutenant they were coming.

No one inside the convenience store knew that the red points appearing between the stars were not stars.

The lieutenant drove straight toward the store as the sky began to fall.

CHAPTER FORTY-TWO CANDY DUST - SHOOTOUT IN THE CONVENIENT STORE

Bo dove for cover as laser beams destroyed candy in all directions.

A red beam passed over his helmet and converted a display of chocolate bricks into chocolate gravel. Another cut through six hanging coils of lunar lime, which snapped apart and rained glowing sugar. A third struck a pressurized barrel of chewing resin. The barrel burst with a dull metal cough and sprayed the overhead dome green.

Bo landed on his stomach behind a shelf marked HOLIDAY SWEETS and CIVIL DEFENSE.

The shelf exploded and before the debris finished raining down, he began crawling towards the back of the store.

Crunchy debris covered the floor. Candy fell around him from broken racks, shattered tubes and the small artificial weather system caused by the store's failing airlock. Colored spheres bounced from his helmet. Fruit slabs broke against his back. Powder settled over the white, red, blue and gray pieces of his mismatched space suit until he looked as though he had been decorated by a zombielike birthday cake.

Some of the candy was on fire. Bo crawled through that part faster. He kept his inner visor up so he could take in the sweet smell of burning candy.

Every few steps, he stopped to drag one finger through the dust on the floor. He brought the finger into his helmet through the open visor and licked it.

The first sample tasted like strawberry and rifle lubricant. Bo considered it acceptable. The second tasted cold at first, then hot, then like someone had whispered the idea of a lemon into his left ear. Bo considered it confusing but ambitious. The third sample contained powdered chocolate, broken glass and a small amount of floor wax. Bo considered it too crunchy.

A laser beam sliced the aisle marker above him. The sign reading CANDY fell beside his head with the C burned away.

Bo considered that ominous and crawled faster.

The store had become a maze of smoke, syrup, steam and overturned merchandise. Pressure shutters had blocked the windows. Emergency

lights flashed red when they remembered to work. Helmet radios carried a dozen voices at once.

“Advance left!”

“Which left?”

“My left!”

“I can't see your left!”

“Saturnian behind the canned fish!”

“That's a mirror!”

Rifle fire answered every question.

Bo reached the end of the candy aisle and peeked around the corner. The hardware aisle ran toward the back of the store. Hand tools, drill bits, pressure patches, reactor hoses, fasteners, explosives and farming implements had been arranged together according to the ancient retail principle that people looking for one dangerous object might buy another.

Arles was pinned down halfway along it. The old man sat on the floor with his back against a display of socket wrenches. His pajama bottoms with the yellow ducks showed beneath the lower half of his space suit because he had dressed in a hurry. Grenade bandoliers crossed both shoulders. He fired his rifle randomly toward the front of the store while scooting backward on his butt.

Each shot pushed him another inch and he had developed a respectable speed. A beam struck the shelf above him. Hammers, pliers, and boxed detonators cascaded onto his helmet.

Arles fired into the ceiling. Something heavy fell in another aisle and screamed.

“Arles!” Bo called.

Arles twisted around and nearly shot him. “Oh. It's you.”

“Do you have an extra rifle?”

A laser bolt cut between them and melted a row of crescent wrenches into one long, useless wrench.

Bo flattened himself. “I have plenty of ammunition,” he continued. “I forgot the part that shoots it.”

His shopping basket was still looped over one arm. It contained pistol

cartridges, rifle cartridges, artillery cartridges, antique gunpowder rounds, three candy tubes and a compressed caramel brick he did not remember taking.

Arles glanced at it. “Forget the rifle. What you need are grenades.” He pulled several grenades from his chest and held them out.

There were four different shapes. One was round, one was cylindrical, one was shaped like a small pyramid and one appeared to be a metal saltshaker. None used the same safety mechanism.

More hung from bandoliers over Arles's shoulders. The old man carried enough explosives to demolish the store, the village and several nearby definitions of private property.

Bo stared at the grenades. His memory had never been dependable, especially since someone had shot a hole through it. This memory, however, arrived perfectly. He remembered Arles dropping a collection of live grenades into the back of a moving crawler. He remembered the tiny word that followed. Oops.

Bo hesitated.

“They're not safe,” Arles said. One of the grenades began ticking. Arles struck it against the floor until it stopped. “But that’s a good thing.”

Bo had not finished hesitating when two Vacuum Corps soldiers appeared around the corner.

They came fast, rifles raised, boots grinding candy into the floor. Both wore clean combat armor with matching plates. Their visors were down. One had a corporal's stripe painted across his chest. The other had a price sticker stuck to his helmet.

They saw Bo and Arles on the ground and stopped. The corporal swung his rifle toward Bo. The second soldier covered Arles. Their short-range helmet radios joined the same open channel. “We found two more Saturnians over here,” the corporal shouted. “Permission to waste them.”

Static crackled.

Their NCO replied from somewhere near the front counter. “Quit asking permission to…”

Bo jumped up. He did not decide to jump. His legs made the decision and informed the rest of him while it was happening.

The grenades remained in Arles's hand.

Bo charged before the the two soldiers had time to fire. One rifle produced a click. The other sent a red beam past Bo's right side and through a rack of power drills. Every drill switched on at once and scattered across the floor like angry mechanical insects.

Bo lowered his head and stretched both arms wide. It was a wrestling move he had practiced against pillows, bunks, kitchen equipment and one fellow soldier who had not known they were practicing. It required timing, commitment and an opponent willing to stand still for reasons of choreography.

The soldiers stood still because they were surprised.

Bo's forearms struck them where their helmets met their space suits.

The move was called a clothesline and it lifted both soldiers off the floor. Callisto's gravity gave the move unnecessary elegance. Their legs floated up behind them. Their rifles spun away. For a brief moment they traveled horizontally, parallel to the candy-coated floor, like two men lying down before gravity had been consulted.

Then gravity decided it mattered again and slammed them down flat on their backs.

Bo kept going. He could not stop. His boots had found spilled chewing resin. He slid through the hardware aisle with both arms still extended, knocked over a display of toilet plungers, and disappeared around the next corner.

Behind him, the two soldiers flailed on the floor. Their suits had protected their necks but not their dignity. One tried to sit up. The other reached for his rifle.

Arles stopped scooting. He brought his rifle to his shoulder. Two bright red flashes permanently silenced them.

Bo did not see that part. He was sliding backward through sporting goods, spinning slowly, his basket shedding ammunition in a glittering trail. He struck a display of bats, bounced into a wall of camping cookware, and came to rest inside a child-sized inflatable survival raft. There were no lakes on Callisto.

The raft automatically inflated around him. A cheerful recorded voice announced, “YOU ARE NOW SAFE.”

CHAPTER FORTY-THREE CONVENIENCE STORE HIGH GROUND

Serj reached the top of the convenience-store dome and unexpectedly found Moe already there.

The roof was not meant for people. It was a transparent pressure shell curved like the upper half of a soap bubble, slick with frost and trembling whenever something exploded below. A narrow maintenance ladder ended at an antenna platform no wider than a kitchen table. The platform had been bolted to the dome with six brackets, of which four were desperately trying to escape.

Moe lay flat beside the antenna relay with his rifle under one arm and a pair of Saturnian binoculars pressed to his visor. The setting sun stretched his shadow down the curve of the dome until it reached the street.

An advertisement transmitter beside his head repeated the same message every twelve seconds: MEAT PLANKS. NOW WITH SEVENTY PERCENT LESS DEAD FLESH. The relay broadcast the message across the village on every civilian frequency, including the emergency channel.

Below them, the battle inside the convenience store flashed through the polarized dome. Red beams struck the inner surface and spread into dull blossoms of light beneath their boots. The roof made a deep glassy groan each time. Candy, steam and fragments of shelving spun under the dark shell like contents shaken inside a snow globe.

Moe lowered the binoculars seeing Serj settle in next to him. “Great minds think alike.”

Serj pulled himself closer. “What do you see?”

From the top of the dome they could see the length of the main street. Moe reported that the third lieutenant's enforcement unit had entered from the north and found the village waiting for it. One buggy burned halfway through the post office airlock. Another sat broadside in the street, firing missiles into upper windows. Motorcycles darted between buildings while red laser beams stitched after them. Return fire came from everywhere.

Serj borrowed the binoculars and had a look.

A rifle flashed from the barber shop roof. Another fired through the letter slot of the post office. Someone had mounted a mining laser

behind the school bell and was using the bell as an armored shield. Rockets crossed above the street so slowly in Callisto's gravity that Serj could watch their courses bend before they struck.

Moe said, “I didn't know the rest of our squad had that much firepower in them.

“Neither did they.” Serj handed the binoculars back to Moe. “Maybe a few of the locals are pitching in.”

A sidecar disappeared in a white flash. Its motorcycle continued without it, rose over a drainage bank and buried itself nose-first in a pharmacy wall. The driver remained seated for several seconds after the machine stopped. Then the wall collapsed on him.

“Man, they're taking those three wheelers apart.” Moe said, watched through the binoculars. “We might have a chance of coming out of this alive.”

Serj tapped Moe on the shoulder and pointed skyward. “Unlikely.”

Moe followed his hand.

The sky over Callisto was black, but the sun was low and behind the village. Its light struck anything descending from orbit. At first the objects resembled a loose patch of stars. Then their positions changed. They brightened one after another, each becoming a hard white point with a faint line beneath it.

There were dozens of lights and more appeared while they watched. The drop ships fell almost vertically, arranged in expanding rings around the village. Maneuvering thrusters blinked along their sides. Sunlight flashed from their hulls with every correction, pinpointing them even from orbit and making concealment unnecessary for the simple reason that nobody on the carrier knew concealment was needed.

A drop ship separated into two bright pieces high above the western ridge. One piece continued toward the village. The other changed direction and vanished behind the mountains. Neither deployed troops. The remaining lights kept descending.

“So what’s the plan, serge?” Moe asked.

“Utnam has secret tunnels under his dome. They lead to the Mooninite village.”

Moe turned his helmet toward him. “We’re in the village.”

“The real one. Buried way back in the mountain.”

“So what’s this place?”

Serj looked down at the street. The little post office, motel, school, barber shop, convenience store and pressure domes stood in the open center of the valley where satellites could photograph them and Jupiterian patrols could count them. Their signs were large. Their roads were obvious. Their agricultural equipment was old enough to appear harmless. Every public building had been repaired many times and never improved.

“A distraction,” Serj said. “You don't think they're dumb enough to live out here in the open, do you?”

A missile struck the historical society. The building opened like a box. Air, papers, furniture and fragments of preserved farming equipment rushed into the street. A human figure emerged with them, turning slowly in the low gravity. The figure struck the side of a buggy and stopped moving.

Moe watched it without the binoculars. “Convincing distraction.”

“Has to be.”

“Do the people working here know that?”

Serj did not answer.

The advertisement relay continued it’s adverts between them.

They took turns with the high tech binoculars. The Saturnian lenses stripped smoke from the view, corrected for glare, measured distances, identified heat sources and offered survival probabilities beside anything shaped like a person. They were excellent for watching people die accurately.

Serj found Etty on the ridge east of the village. She lay on top of an unused grain silo. Her white armor blended with the metal building except for the dark barrel of her rifle. Each time she fired, one of the lieutenant's soldiers dropped or a weapon stopped moving.

A number appeared in the binoculars beside her. RANGE: 284 METERS.

Another number counted down her life expectancy in seconds.

Serj watched her fire once. Twice. Three times. A buggy gun turned toward the silo.

Etty saw it. She rolled away from her rifle and began crawling down the

far side on a rope ladder.

The heavy laser fired. The beam did not look wide through the binoculars. It was only a clean red line crossing the distance between the buggy and the ridge. Where it touched, the silo flashed into vapor.

Etty disappeared inside the white cloud as the countdown reached zero. The cloud cleared quickly in the near vacuum. Her rifle appeared atop the wreckage. The forward half of her suit lay several meters from it. The binoculars outlined both pieces, failed to decide which was Etty, and marked them as two possible personnel. One outline changed from yellow to red. The other did not change at all.

Serj kept looking.

“What?” Moe asked.

Serj handed him the binoculars.

“Edge of town, where the grain silo used to be.”

“Use to be?” Moe looked. His mouth tightened. He moved the view away without saying her name. The battle continued.

Moe swept the street and found Ick. The mechanic emerged from a storm drain directly in front of a moving buggy. His ruined face was invisible behind his visor, but the hunched right shoulder and hopping gait identified him. He carried no rifle. He carried a wrench almost as long as his arm.

Ick jumped. In Callisto's gravity he rose slowly enough for the buggy driver to see him coming and too quickly for the driver to understand why. Ick landed across the hood, caught a handhold beside the reactor intake and swung the wrench into the engine housing.

The buggy swerved. Ick struck it again. The housing split and steam erupted around him. The front treads locked while the rear treads kept pushing. The buggy turned sideways, carrying Ick with it, and crashed through the barber shop.

For one silent instant it sat halfway inside the building. Then the reactor exploded. The barber shop dome bulged outward. Cracks spread across it in a white web. A second explosion lifted the roof and the atmosphere beneath it escaped in a cloud full of mirrors, chairs, razors, and hair.

Moe lowered the binoculars and pulled his rifle from beneath his arm. He braced it across the antenna railing. “I can reach the buggy behind them.”

Serj put one hand on the barrel and pushed it away. “No.”

“I can take the gunner.”

“Then the next one sees the shot.”

“They're killing our people.”

“It's a lost cause.”

Moe pulled the rifle against Serj's grip. Serj did not let go.

Below them, something struck the convenience-store dome. The shell flexed under their knees. One of the antenna brackets tore free with a metallic pop. The platform tilted several degrees toward the street.

The advertisement relay continued without interruption. NOW WITH LESS DEAD FLESH.

Moe looked at Serj and the scowl on his face.

“Live and fight another day,” Serj said.

Moe looked toward the edge of the village, where Etty's rifle still lay beside the two red outlines. Then he looked toward the barber shop, where the crater glowed around the remains of Ick's buggy. “We'll meet the survivors at the rally point,”

“If there are any.” Serj’s words made the decision sound procedural.

In Moe's mind that made things worse.

They waited. The lieutenant's remaining vehicles pushed south toward the store. The ambushers shifted positions to follow them. Fire moved away from the rear of the dome. Smoke and vented atmosphere drifted across the street, spreading low along the ground before freezing into glittering dust.

The lights in the sky grew larger. Individual drop ships were visible now: long dark needles wrapped in reflected sunlight. Each carried enough soldiers to fill the village. Their approach made no sound through the vacuum, but the ground had begun to tremble beneath them.

Serj waited until the rear alley was empty. “This is our chance.” He swung over the edge of the platform and slid down the back side of the dome.

Moe followed with the rifle across his chest.

The transparent shell was too slick to climb and too curved to stop on. They descended on their backs, boots first, passing over the battle

flickering beneath them. For several seconds they slid across a ceiling while soldiers fought on the other side of the glass below them.

One soldier looked up. His visor followed them then the end of his rifle. Before he could fire, a beam from another aisle cut him down.

Serj and Moe reached the bottom of the dome and dropped into the shadow behind the store. They landed among discarded packing crates and frozen garbage. Neither looked back.

They crossed the rear service lane one at a time, moved through the ruins of a greenhouse and disappeared between two pressure conduits leading toward an abandoned warehouse.

Behind them, the first drop ship passed across the setting sun. Its shadow swallowed the street.

CHAPTER FORTY-FOUR BLAZE OF GLORY - PLAN B AT SUNDOWN

Rbra, Lvis and Oan met behind the town hall.

It was the only building on the block that had not been damaged. This was not because anyone respected local government. The town hall stood behind the water-reclamation dome, and every shot fired at it had struck the sewage tanks first. The tanks were still holding, so far, and the building had acquired a protective smell.

The three soldiers arrived from different directions. Rbra came through a service alley with her rifle in one hand and a smoking rocket tube in the other. One shoulder plate was missing. A black laser scar crossed her chest armor. She threw the empty tube aside and checked the street behind her.

Lvis stepped out of the town records office carrying a pistol in each hand. They were not ordinary pistols. Each had a belt of laser cartridges feeding from an ammunition pack on his back. The belts looped beneath his arms and clattered against his suit when he walked. The arrangement gave him the firepower of a squad automatic weapon, the accuracy of two pistols fired at once and the balance of a man tangled in extension cords.

His large black hair pressed against the inside of his visor like a trapped storm cloud.

Oan emerged last. The quiet little suit mender held a long sword in both hands. It was almost as tall as she was, narrow at the point and dark along the edge. No one had ever seen it at the motel. No one knew where she had been keeping it. Her tool satchel still hung from one hip. She carried the sword out in front of her like a noble warrior from an old adventure serial. There was blood frozen along the blade.

Rbra looked at her.

Oan looked back.

Neither mentioned the blood.

They formed a small triangle in the shelter of the town hall wall. Laser fire crossed the intersection beyond them. The post office burned at one end of the street. The barber shop was gone. The convenience-store dome flashed from within, black glass lit by red beams.

“I saw Etty go down with the silo,” Rbra said.

Lvis lowered his pistols. “Ick went out with a blaze of glory and an buggy.”

Oan's voice came quietly over the short-range channel. “Rothy.”

Rbra turned toward her.

Oan did not explain at firnsidest. She looked down at the sword. “She was trying to reach the radio shed. A motorcycle got her.”

The three of them stood without speaking. The shooting filled the silence for them.

Lvis looked toward the store. “This is the end.”

Rbra punched him in the shoulder. The blow turned him halfway around. “You have the least faith of any of us,” Rbra said.

Lvis steadied himself. “It's true.”

“You're the chaplain.”

“That's how I know.” He looked toward the burning street again. His voice dropped into the low register he normally reserved for sermons, songs and asking people to lend him money. “Faith is the substance of things hoped for and the evidence of suspicious minds. Or maybe that was love. Either way, we're outnumbered.”

Rbra punched him again.

Oan looked at the nearby vehicle and motioned towards with her head.

It was the mayor's private vehicle. Calling it a crawler was technically defensible. Calling it a buggy was socially safer. The machine used four short crawler tracks under a lifted suspension, with a narrow cab in front and an open fighting bed behind. Its reactor had been modified with polished intake pipes, an oversized steam condenser and a hand-painted warning on the side: OFFICIAL MUNICIPAL BUSINESS. A second hand-painted warning beneath it said: NOT POOP.

The vehicle stood nearly six feet off the ground. Chrome exhaust stacks rose behind the cab. Floodlights covered the roof. The front plow had been sharpened and plated in brass. A heavy assault rifle occupied a rotating mount in the cargo bed, although municipal records described it as a snow-removal aid.

Rbra walked around it once. “Mayor's probably in his bomb shelter taking a crap.”

“Inspiring,” Lvis said.

“He has no right to complain if we borrow this.”

Oan studied the gold-painted mayoral seal on the door. “Ugly.”

“If we live, he can bill us.”

“And if we don't?” Lvis asked.

“He can file a claim with Red Spot Casualty.”

Rbra climbed onto the rear track and pulled herself into the bed. She tested the mounted gun. Its charging motor whined. A row of green lights illuminated beside the grips. “We're going back for whoever's left in that store,” she said. “We pull them out and high-tail it out of town.”

Lvis looked at the store. The dome pulsed red through smoke. Soldiers moved around the entrance. A buggy was approaching from the north behind two motorcycle screens. “Or?” he asked.

“Or we go out in a blaze of glory trying.”

Lvis raised both pistols. “Glory, glory, hallelujah. You ain't nothing but a burning bush.”

Rbra stared at him. “That's several different things.”

“It's a medley.”

Oan placed one boot on the passenger track and climbed into the cab. “Let's go.”

Lvis jumped behind the controls. The mayor had removed the standard ignition and replaced it with a biometric palm reader, a retinal scanner and a brass keyhole. A small label warned that unauthorized operation was punishable by fines, public embarrassment and loss of village parking privileges.

Lvis put both pistols between his knees then carefully pulled a wire from beneath the dashboard with his left hand, striped the insulation with a special tool then touched it to a second wire. An electric shock lit his visor blue.

The engine did not start.

“Wrong sacrament,” he muttered before trying two more wires.

The floodlights came on. A musical horn played the first three notes of the Callisto municipal anthem in their helmets and stopped because it forgot the fourth.

He tried again and the crawler-buggy roared to life. The reactor surged. Steam blasted from both chrome stacks. The suspension lifted another six inches. A recorded voice welcomed MAYOR ULLM and reminded him of an unpaid campaign-finance penalty.

Lvis grabbed the wheel. “I have seen the light.”

Rbra slapped the roof. “Quit goofing off. Move!”

Lvis drove through the town hall fence. The mayor's machine landed in the street hard enough to bounce all four tracks from the ground. Oan struck the cab ceiling. Rbra held the heavy gun and stayed upright with the help of inner rage.

The vehicle accelerated. Its reactor had been tuned for campaign parades, emergency evacuations and illegal racing on agricultural roads. It reached forty miles per hour before Lvis found the brake pedal. He decided not to use it.

The first anti-smuggling soldier stepped into their path and raised his rifle.

Rbra fired. The mounted assault rifle used a linked belt of oversized laser cartridges. Each trigger pull fired six beams in less than a second. The beams walked across the street, cut through the soldier's outer layer and opened the pharmacy wall behind him.

The recoil mechanism hammered the vehicle bed even though laser weapons had almost no recoil. The manufacturer had included the effect because customers expected that heavy weapon feel.

Rbra held the trigger down. Red light swept ahead of them.

Soldiers scattered behind parked crawlers, street signs and pressure pylons. Rbra shattered the signs, sliced the pylons and carved burning lines through the crawlers. One soldier tried to leap over the municipal vehicle in Callisto's low gravity. The brass plow caught him on the way up and improved his trajectory.

Lvis drove toward the store. His ammunition belts fed from the pack behind his seat. He steered with his knees, leaned out the driver's window, and fired both pistols at opposite sides of the street.

He hit very little. What he hit objected strongly.

“Keep us straight!” Rbra shouted.

“The straight and narrow path leads to destruction!”

A motorcycle came alongside the passenger door with its driver aiming a pistol at Oan.

She leaned out swinging the sword once. The blade did not attempt to cut the soldier's armor. Oan knew armor. She had spent years sewing around it, replacing seals, repairing torn joints and cursing designers who put load-bearing stitches under rigid plates. Her sword entered precisely between the helmet ring and shoulder collar.

The motorcycle continued without its driver.

Oan caught the handlebar with the hooked guard of her sword and pulled. The empty machine turned across the street and struck two soldiers running toward them.

She sat back down with a word.

Lvis looked at her. “Remind me to confess you later.”

Oan wiped the blade on the heel of her boot. “You talk too much.”

They crossed the first intersection. A buggy blocked the next one. Its forward gun rotated toward them. Two soldiers crouched behind the armor skirts. A third stood in the turret, waving the gunner onto target.

Rbra saw it. “Left!”

Lvis turned right. Realizing his mistake, he wrenched the wheel the other way.

The mayor's vehicle climbed the steps of the post office, crossed the lobby through the hole left by the first buggy and emerged through a wall. Mail burst around them. Frozen envelopes stuck to the windshield. A package containing someone's replacement foot landed in Oan's lap.

The blocking buggy fired. Its beam passed behind them and cut the town hall clock tower in half. The upper section fell slowly in the low gravity, taking several seconds to decide which street it intended to destroy.

Lvis drove off the post office loading dock. The vehicle dropped eight feet and landed on the far side of the intersection. Its suspension compressed to the frame, threw all three occupants upward and returned them to approximately the same locations.

Rbra's gun never stopped firing. She swept the buggy turret. The gunner vanished in a red flash. Oan leaned from the window as they passed and cut through a steering cable exposed beneath the front armor. The buggy lurched forward, turned in a tight circle and began firing into its own troops.

“That one counts as ours now,” Lvis said.

“Eyes forward,” Rbra ordered.

The convenience store was less than two hundred feet away.

The third lieutenant's remaining buggy raced toward it from the opposite direction. Its armor was scarred. One wheel smoked. Two motorcycles had begun the approach beside it, but only burning pieces remained on the road behind.

Rbra saw the buggy through the steam and muzzle flashes. “Don't engage that one. We get to the store, load whoever's not eighty-sixed and retreat.”

“Which way?” Lvis asked.

“Anywhere that isn't here.”

More anti-smuggling troops emerged from an alley ahead. Rbra fired low. The street erupted beneath them. Soldiers fell. Those who remained standing ran toward cover.

Oan leaned out again, sword extended. She caught rifle barrels, helmet antennas, oxygen hoses, shoulder straps and one ammunition belt. Nothing stayed attached for long. One soldier came close enough to grab the passenger door. Oan struck the release lever on his helmet ring with the sword's pommel.

His helmet launched upward and the soldier let go to retrieve it. His last mistake.

“Store in twenty seconds!” Rbra shouted.

“Ten,” Lvis said.

The heavy gun overheated. Warning lights changed from green to amber, then red. Rbra released the trigger. The barrel housing glowed against the dark street.

For the first time since leaving town hall, the vehicle entered a pocket of calm.

Lvis looked into the side-view mirror. The lights in the sky had grown larger. They no longer resembled stars. They were long descending shapes with thrusters burning along their sides. Hundreds of smaller lights clustered around the formation, having recently been released.

One drop ship crossed the setting sun. Another followed. Then six more. Their shadows raced over the ridges toward the village.

Lvis watched them in the mirror for half a second too long. “Rbra.”

“What?”

“We’re about to get company.”

CHAPTER FORTY-FIVE NO FANGS - KNIFE SHOWDOWN IN THE PARKING LOT

Bo walked through the remains of the store.

The store had not been designed to have remains. It had been designed to have aisles, competitive prices and a cheerful dome beneath which customers could purchase ammunition beside candy without contemplating the relationship between the two. The battle had corrected this oversight.

Shelves lay across one another in blackened rows. Cans of powdered soup had burst and mixed with shattered glass. The refrigerated case had opened like a jaw and discharged frozen pies across the floor. One pie still revolved slowly beneath a blinking sign that said FRESH FISH.

A dozen soldiers were dead among the wreckage. Bo stopped beside the first one. Red laser holes had been drilled through the soldier's chest plate, shoulder and visor. The edges of the holes were smooth and glassy. Nothing moved inside the suit. The dead man wore Vacuum Corps armor and so did the next one.

Bo crossed the aisle and checked a third. Vacuum Corps. The fourth had lost his helmet, which made inspection easier and identification harder. He had a vat-grown face, broad shoulders, tan skin and no fangs.

Bo checked his mouth anyway. Still no fangs.

None of them wore Saturnian uniforms. None were hunchbacked. None appeared to speak French. They looked like soldiers from Bo's carrier, except they had arrived with instructions to shoot everybody in the store and had followed those instructions with admirable impartiality.

Bo straightened and looked over the bodies. It occurred to him that someone might have made a mistake. This was his first accurate understanding of the battle.

A deep metallic bang passed through the dome. Bo looked up.

The emergency shutters had descended over most of the transparent panels, but several had stopped halfway. One hung diagonally by a single hinge. Another had folded around a support rib and locked itself in the open position. Through the gaps Bo could see the darkening blue at the horizon, the black sky above it, and moving sparks that were becoming soldiers.

Jet-pack troops were coming down outside the village. At first he counted a dozen. Then his new eye focused and found hundreds more behind them. They descended in loose formations, rifles beneath them, exhaust plumes above them, like rain that had been issued weapons and taught to hate the ground.

Cracks had formed in the store's glass walls. They branched through the thick panes in pale white lines. Every distant explosion lengthened them. Tiny flakes jumped from the inside surface and drifted down onto the bodies.

The store's pressure system continued to insist everything was normal.

PLEASE COMPLETE YOUR PURCHASE BEFORE DEPARTURE, said a recorded voice.

A window gave a short, sharp crack. Cold vapor crawled inward through a new fissure. The dome had claimed a circular footprint of Callisto and filled it with warmth, air, merchandising and debt. The vacuum outside had waited patiently. Now it was beginning the repossession process.

Somewhere behind the wrecked aisles, Arles laughed.

Bo turned toward the sound.

There came a clatter of metal, the rapid patter of boots, and another delighted laugh from someplace near automotive supplies. “Arles?”

No answer.

A grenade went off in the stockroom. “Found some!” Arles shouted.

Bo decided he didn’t like Arles anymore.

He made his way to the front airlock. The inner door stood closed, its narrow observation panel crazed with cracks but still transparent enough to see through if he pressed his new eye against it and closed the old one.

The parking lot was empty. The Vacuum Corps crawler sat where it had been abandoned, surrounded by empty shopping carts.

A chrome flash appeared at the end of the street. The mayor's crawler-buggy hybrid came over the curb at speed.

As Bo watched it did not slow down for the parking lot. It crossed the first row of vehicle stalls, flattened a tire charging station and struck the troop crawler broadside. The collision lifted the troop crawler onto two tracks and drove it six feet across the ice. The mayor's vehicle buried its

brass plow under the other machine and stopped with its rear end bouncing.

Lvis climbed out through the driver's window because the door had become part of the troop crawler.

Oan came out the other side with her sword already raised.

“Hey!” Bo shouted.

Neither heard him through the airlock.

He slapped the door control. The panel answered with a sick electronic buzz. He slapped it again. BUZZ. “Open.” BUZZ. “Please open.”

The panel considered his improved manners and buzzed.

Bo seized the manual wheel and pulled. It refused to turn. He planted both boots against the frame and used his new arm. The arm tingled, shuddered and bent the wheel without moving the door.

Outside, Lvis and Oan ran toward him, whether they could see him he couldn’t tell.

Then the silhouette of a figure stepped between them and the store. The third lieutenant emerged from behind the damaged troop crawler with a limp and a long pistol in one hand. Frost scarred his armor. One side of his helmet had been repaired with an entire access panel cut from some other vehicle. His altered reddish skin showed through the visor. Even wounded, he stood straighter than anyone else in the parking lot.

He raised the pistol toward Oan and Lvis.

Rbra was still in the mayor's vehicle. She hauled the heavy assault gun around on its mount and squeezed the trigger. Nothing happened. She pulled again. The overheated mechanism gave a small internal cough and ejected a cartridge that glowed white as it fell.

“You municipal piece of…” The rest of her assessment was lost as she kicked open the rear gate and jumped down.

Lvis stopped in the center of the parking lot. He let both ammunition-fed pistols hang beside his legs. His elbows bent. His shoulders settled. Through smoke, crushed ice and a century of cultural confusion, he achieved the unmistakable silhouette of a western gunslinger.

The third lieutenant stood thirty feet away. Neither man moved.

Meanwhile the jet-pack troops continued descending behind them.

Lvis spoke in the deep voice he used when he wanted the universe to provide musical accompaniment. “A little less conversation.” Then he fired both pistols.

Red beams snapped across the parking lot. They cut a streetlight in half, opened two holes in the troop crawler, melted the mayor's side mirror, and wrote a brief illegible message across the store's outer wall.

The third lieutenant did not move.

Lvis kept firing. His ammunition belts jumped and rattled behind him. Every shot missed.

The lieutenant extended his long pistol and fired once. A red point appeared in the center of Lvis's chest. It widened through his armor and emerged between his shoulders in a spray of incandescent material. His pistols went silent.

For an instant he remained standing in the pose. Then his knees folded and Father Lvis fell forward on his guns.

Oan did not stop. She came up behind the lieutenant without a sound, holding the long sword in both hands. The blade swept toward the seal below his helmet.

At the last instant he turned he stepped aside. The blade passed his chest by an inch. He caught Oan's wrist, planted one boot against her stomach and drop-kicked her into the low Callistonian gravity.

Oan sailed across the parking lot, her sword spinning away in a separate arc. She struck a ridge of crushed ice left by the last road scraping, disappeared into it up to her waist and did not move again.

Bo screamed and hammered both fists against the inner airlock door. “Leave them alone!”

The door remained closed.

Rbra ran at the lieutenant with a knife in each hand.

He tossed his pistol aside. It slid across the ice and stopped beside Lvis. From a sheath inside his forearm armor he drew one narrow blade.

Rbra slowed. They circled each other between the wrecked vehicles.

Bo pulled at the bent wheel until his new hand locked into a fist around it. The airlock made no concession to love, urgency, or replacement limbs.

He ran back into the store.

The hardware aisle was no longer an aisle. It was a mound of half-melted tools, fused nails, snapped handles and household reactor parts that had never been legal for household use. Bo climbed onto the pile and began throwing things aside.

Behind him, Arles laughed again.

“Not now!” Bo shouted.

He found something that looked like a sledgehammer. It had a three-foot handle, a square metal head and instructions printed along the shaft in six languages. The first instruction was DO NOT STRIKE OBJECTS WITH THIS TOOL.

Bo ran back to the airlock.

Outside, Rbra and the lieutenant were still circling. The lieutenant made a small movement with his knife. Rbra blocked it. He cut across her upper arm. She drove one blade at his side and opened the armor below his ribs. He stepped away. Frozen blood scattered between them in dark red beads and bounced across the ice.

Bo swung the hammer. The observation panel exploded outward. A jet of air seized broken glass, wrappers, dust and three promotional coupons and fired them through the hole. Bo held onto the hammer while the pressure tried to pull him after the coupons.

The emergency shutter inside the door dropped six inches and jammed.

He swung again. This time the hammer tore through the locking mechanism. The inner door folded outward far enough for Bo to force one shoulder into the gap. Air shrieked past him. His boots slid through candy dust. His new arm trembled, then shoved. The door relented and opened.

Bo stumbled into the outer chamber, struck the already broken exterior door with the hammer, and knocked the entire door out of its frame.

He stepped into the parking lot.

The pressure escaping behind him became a glittering white plume as the warmth froze out of it. The store alarms finally admitted there was a problem. THANK YOU FOR SHOPPING WITH US, they announced inside every helmet with in a thirty yard radius.

Rbra was bent forward now. One leg dragged when she moved. Both knives remained up, but one hand shook. Cuts crossed her shoulder, thigh and abdomen. Blood had frozen to her suit and lay scattered

around her in red splinters.

The third lieutenant was bleeding too. A deep cut marked his side, and another ran along his helmet collar. He stayed in the center of the parking lot, turning slowly as Rbra circled him. Between the two of them, he was in better shape.

Bo lowered the sledgehammer and ran toward him. “Hey, mold reject!” It was a name he remembered someone calling him back on the Arley Mith.

The lieutenant looked over.

Bo's boot came down on the frozen contents of a ruptured beverage pouch.

His legs went forward. The rest of him went backward. He struck the ice, kept moving and slid between Rbra and the lieutenant with both hands flailing above his head.

The lieutenant stepped over him.

Bo slid past, crossed the parking lot and disappeared halfway under the troop crawler.

Above them came the exhaust shockwaves of many jet packs attempting to create a temporary atmosphere.

The descending soldiers had reached the village.

They circled the parking lot in widening rings. Some hovered twenty feet above the ground. Others swept between the buildings. Hundreds of rifles pointed down through the exhaust haze.

The third lieutenant straightened despite his wounds. He dropped the knife and raised both empty hands in the command gesture taught at officer school.

“Third Lieutenant, Jupiter Vacuum Corps,” he transmitted on the general channel. “Anti-smuggling enforcement command. Arrest the smugglers. Secure the store. I repeat, arrest the…”

The hovering soldiers ignored him. They suddenly swooped down and filled the parking with laser fire.

The third lieutenant looked up. Surprise reached his face just before the first beam reached his armor.

Then a hundred red lines crossed him at once. His pistol arm separated at the shoulder. His chest plate divided into glowing squares. His

repaired helmet opened in strips. The officer who had survived the factory, Jupiterian contempt, warrant school, demotion, reinstatement, a hopper crash and every subordinate assigned to him came apart in the space between one order and the next.

The pieces struck the ice still trying to stand at attention.

The fire swept sideways, acquiring a new target.

Rbra jerked as beams struck her back and leg. One knife fell. She turned as if to identify whoever had shot her, then collapsed beside the wrecked troop crawler.

“Rbra!” Bo crawled out from under the vehicle.

Laser beams drilled smoking holes around his hands. He ran anyway. A beam passed between his knees. Another struck the head of the sledgehammer where he had dropped it, turning the metal into a bright red splash. A third hit Lvis's ammunition pack, which began firing its remaining cartridges in every direction without him.

The parking lot became busier.

Bo reached Rbra and grabbed the straps across her chest. She was heavier than he expected and lighter than fear said she ought to be.

Her visor was dark. Frost gathered inside it.

“Don't be dead,” he said. “I don't know how to do dead.”

A laser struck the ice beside her helmet.

Bo pulled. His new arm finally obeyed him. It hauled while his old arm dragged and his boots slipped. He ran backward through the incoming fire, towing Rbra across the ice. Red beams passed over her, under her and through every place Bo had occupied a fraction of a second earlier.

He did not know who the soldiers were shooting at and he no longer cared.

The broken airlock waited ahead, exhaling the last warm breath of the store into Callisto's evening.

Bo dragged Rbra back inside.

CHAPTER FORTY-SIX THE MANAGERS OFFICE AND ARLES JACKPOT

The manager's office had a private airlock.

This was advertised in the employee handbook as an emergency safety feature. Its practical purpose was to let the manager enter and leave without crossing the sales floor, speaking to employees or being asked why their pay had been calculated in store coupons.

One door opened into the store. The other opened into the alley. Between them was a cramped office containing a desk, a safe, two filing cabinets and enough independent atmosphere for one manager to survive most disasters while continuing to deny refunds.

Bo dragged Rbra through the sales-floor door.

The office pressure alarm shrieked as he pulled her across the threshold. He threw himself against the control panel. The door tried to close on Rbra's boot, reopened, tried again and finally sealed after Bo kicked her leg clear.

Pumps rattled inside the wall. The warning light changed from red to yellow. Air hissed from a ceiling vent and returned sound to the room a little at a time.

First came Bo's breathing. Then came the alarm. Then came nothing from Rbra.

He sat on the floor with her between his knees and fumbled with the catches around her helmet ring. His replacement hand would not obey him. He slapped it against the floor until the fingers opened, then used both hands to twist the helmet free.

The seal released with a soft pop.

Rbra's face was still. Her eyes were partly open. Frost had melted along her eyelashes and run down her cheeks in thin tracks. A cut crossed her forehead, but it was not the cut that had killed her. The laser burns in her back had gone through too many important things for medicine to argue with.

“Rbra?” Bo touched her cheek.

She did not complain.

“Rbra, you can punch me if you want.”

She did not punch him.

He waited because waiting had fixed many things in his short life. Replacement arms began working if he waited. New eyes calibrated. Food stopped hurting. Explosions ended. Sometimes dead-looking soldiers sat up after their suit injected something into them.

Rbra stayed dead.

Bo tried to remember the last thing he had said to her. It might have been her name. It might have been a warning. It might have been something stupid about food. Most of the things he said to Rbra had been stupid things about pieces of food.

He had never told her that the first time he saw her in the carrier hallway, with green potatoes falling from his pockets, she had become the first part of the real world that seemed better than Granny's farm.

He had not known he needed to say it. No one had told him that people could run out of later.

Bo bowed his head against her chest armor. He cried hard enough that the automatic suction inside his suit collar activated and began trying to remove the tears from his face. It was designed for sweat and treated grief as a maintenance problem.

“I didn't get to say goodbye,” he whispered.

The office gave him back his own voice from the metal filing cabinets. Goodbye. Goodbye.

The sound made him angry. He put her helmet beside her head. Then he stood, picked up the knife she still held in one hand and walked toward the outside airlock.

He did not know what he was going to do in the parking lot. For the first time in his life, not knowing did not seem interesting.

The outer door opened. Bo stepped into laser fire and the door closed behind him.

Before Bo smashed the airlock, Arles was at the rear of the store practicing golf. Golf had never established itself on Callisto. A regulation course required grass, lakes, sand traps, open air and several hundred acres of land that could be rendered economically useless. Callisto had ice, vacuum, tunnels and people who considered a hundred square feet of atmosphere a spacious inheritance.

The old reactor specialist nevertheless believed in preserving cultural traditions he had heard described incorrectly.

He had found a length of metal conduit and bent one end with a pipe wrench. This was his club. The stockroom provided balls in a variety of sizes, shapes and prices. Arles had already driven a can of beans into housewares, chipped a frozen dinner through the pharmacy window, and scored what he believed was an eagle with a roll of adhesive tape.

He set a jar of pickles on the floor. “Par three,” he announced to no one.

His helmet was in the restroom. He had taken it off when he went in because the helmet made it difficult to read magazines. On leaving, he had remembered the magazine and forgotten the helmet. The mistake had not mattered while the store possessed air.

At the front of the building, when Bo broke through the airlock the store became re-acquainted with it’s old friend, the vacuum. The first sign of decompression in the stockroom was a whistle beneath the door. The second was the jar of pickles rolling away from Arles just as he began his backswing.

He followed through anyway. The metal tube missed the jar, struck the floor and threw sparks. The jar accelerated toward the sales floor. Boxes slid after it. A display of bargain cookware leaned, considered the direction of the wind, and joined the migration.

Arles planted his boots and held the improvised club across his body. The stockroom door tore open. Air, wrapping paper, canned goods, and Arles went through together.

He struck the end of an aisle with his shoulder. The aisle collapsed beneath him. He rolled across broken shelves, bounced off a freezer, and continued toward the breached front airlock on a tide of receipts and snack food.

Arles opened his mouth to swear but the air removed the swear before he could hear it. His chest tightened. His eyes watered. He still held the golf club, although he could no longer remember why this seemed important.

A children's inflatable camping display lifted from the floor ahead of him. It had been sold as MY FIRST WILDERNESS FORT, suitable for children ages four through nine and rated for indoor climates down to a survivable minus twenty degrees Fahrenheit. The package contained a small plastic tent, an electric inflator, six decorative flags and a warning not to use the product as emergency life-support equipment.

Arles crashed into it headfirst. The collapsed tent wrapped around his face and shoulders. He clawed at the material, trying to see. One hand struck the inflator switch. The tent deployed and bright yellow plastic expanded around his head. Cartoon animals smiled across his visorless field of view. The floor panel sealed against his collar and trapped a bubble of air with him inside it.

Arles drew one astonished breath. Then another. His temporary helmet was four feet wide and shaped like a toy cottage.

The suction dragged him toward the front of the store. He staggered upright beneath the inflated structure, his head occupying the room where imaginary children were meant to sleep. A printed chimney rose above him. Two plastic windows flapped beside his ears.

He could not see the breached airlock, but he could see the store layout through a smiling bear printed on the tent wall. The manager's office was closer. Arles turned sideways and stumbled toward it.

The little tent caught on a shelf. He pulled. The shelf followed. He dragged both for several yards before the shelf struck a body and let go.

The office door stood sealed. Arles hit the control with the end of his golf club. Nothing happened so he struck it again.

The inner airlock opened six inches. Air escaped around the gap, caught the inflatable tent and stretched it toward the front of the store. Arles pushed his shoulder through the opening. The tent tried to remain outside. His head tried to remain inside the tent.

For several seconds the competing systems negotiated. Arles won by biting through a plastic wall.

As the tent tore free, he slipped into the manager's office. The emancipated tent flattened, shot back across the sales floor then vanished through the ruined front airlock with its cartoon occupants still smiling.

The narrow office door sealed closed behind him with a satisfying thunk and Arles slumped to the floor breathing hard. He didn't notice Rbra's body at first; he was more interested in small things he could pillage.

He looked at her unmoving body with a frown then sat up. Her helmet rested near her head. One knife was gone. The other remained sheathed against her leg. Her face told him everything he needed to know and nothing he wanted to confess.

Arles looked away. “Well,” he said.

The office was quiet except for the pumps, the distant rumbles and something heavy striking the outside wall. Then he saw the safe.

“Jackpot,” he said, jumping to his feet.

The safe occupied the corner behind the manager's desk. The door looked closed.

Arles shuffled over and put two fingers against the edge. He had spent decades maintaining fission reactors. He trusted nothing that merely looked closed. His fingers found a spot that felt about right and pulled. It opened.

Managers liked safes. Managers did not like opening safes. Opening one required a combination, two keys, a thumbprint and the patience to wait through an advertisement from the safe manufacturer. Closing it properly meant repeating half the process. Most managers therefore pushed the door nearly shut and trusted employees to fear for their fingernails more than opportunity.

The safe contained payroll envelopes, casino chips, ration coupons, a pistol with no ammunition and a wad of Jupiterian cash held together with a rubber band.

He took the cash. It filled both chest pockets and most of one trouser pocket. He took the casino chips too, because smugglers respected chips in a way cash could never earn. He left the payroll envelopes with uncashable checks inside. Even he could somehow cash them, Arles knew stealing wages was a privilege reserved for management.

Something hammered the exterior door.

Arles looked at Rbra again. “You wont mind if I borrow this, do you?” he asked, picking up her helmet.

Two people, one helmet, one heartbeat; the math was sound. He locked the helmet over his suit collar. It adjusted reluctantly around his head, recognized that he was not Rbra and displayed an identity warning across the visor. UNAUTHORIZED USER.

“Piss off,” he muttered.

The outside airlock still held pressure. Arles cycled into it, waited for the alley door to open and stepped out behind the store.

The alley was empty. Laser fire flashed above the roofs. Farther down the block, shadows moved toward the town square while everyone with sense moved away from it.

The helmet filled his visor with Rbra's unfinished business. Ammunition low. Cooling system damaged. Elevated heart rate. Three messages from Bo. The suit had recorded her death as a temporary loss of connectivity and recommended that she report to maintenance at her earliest convenience.

Arles dismissed the warnings until only her identification remained in the corner of the glass.

CORPORAL RBRA. ACTIVE.

“Optimistic,” he said.

A squad of jet-pack troops crossed the roofline and dropped into the alley ahead of him. Their boots struck the ice almost together. Rifles came up almost together. Their sergeant pointed at Arles. “Identify.”

Arles did not answer. Rbra's helmet answered for him, broadcasting her rank, unit, blood type, disciplinary record and a badly outdated report stating that she was six feet four inches tall and had two legs.

The soldiers slowly approached and peeked into his and the wrinkled face inside it.

Arles leaned on the golf club and waited. “Anyone got a smoke?” he asked.

Their sergeant's visor processed the identification. Regulations said electronic records were more reliable than eyes. Eyes were biological, emotional and occasionally crossed. Records were produced by government computers and were therefore wrong with authority.

The sergeant saluted. “Sorry to bother you, corporal. We got reports of a Saturnian incursion here.”

Arles returned the salute with the golf club. “Sorry sarge,” he said, “Only saw one Saturnian this morning and I beat him to death with this thing. Left the body back there in case anyone else felt the itch.” He thumbed over his shoulder back towards the manager's door.

“Thanks, corporal. That's all we needed to know.” The sergeant patted him on the shoulder then headed for the door.

The squad launched toward the store. One soldier paused long enough to hand him a pack of Moonborough 100s.

“Thanks,” Arles said.

The soldier accepted this and followed the others into the demolished

convenient store.

Arles continued down the alley. The wad of cash made one side of his suit bulge. Casino chips clicked in the other. Every few steps Rbra's helmet tried to correct his gait according to her stride length and pulled his head sharply forward. He solved this by switching the mobility assistance from COMBAT to FORMAL DINING.

Arles tucked the golf club beneath one arm, patted the cash in his pockets and limped into the darkness wearing Rbra's face on his helmet identification display.

CHAPTER FORTY-SEVEN FRIENDLY FIRE - IN THE SUNSET VACUUM CORPS DEFEATS ITSELF

Meanwhile, back in the parking lot a full-on laser battle was underway.

Bo stood behind a support pylon where the dome met the parking lot and stared at it. A few minutes earlier the parking lot had contained a troop crawler, the mayor's stolen crawler-buggy, several injured soldiers, Rbra, Oan, Lvis, the third lieutenant and enough empty pavement to walk between them. Now it contained none of those things in recognizable arrangements.

Jetpack troops dropped through the darkening sky in glittering columns. Soldiers fired up at them. The descending soldiers fired down. Red beams crossed blue beams, although Bo was fairly certain everyone involved carried the same standard red-emitting rifle. The colors changed whenever he blinked.

Chunks of ice jumped from the ground. A motorcycle with a crazed soldier on it raced in a circle until it struck the troop crawler and became several pieces of scrap metal with nobody in them. Somewhere behind the ice berm a heavy weapon hammered so rapidly that its individual shots merged into one long mechanical rumble.

Bo had gone back outside because he was angry. He had forgotten who at.

A burst of laser fire stitched across the pylon where his chest had been. Bo dropped flat, rolled beneath the wrecked cage of a sideways shopping cart, came out the other side then sprinted toward the troop crawler in the center of the lot.

He darted left when the ice to his right exploded. He darted right when a soldier landed in front of him. He darted left again when that soldier's jetpack continued downward without the soldier. Bo had no plan beyond reaching the crawler and was therefore able to change plans much faster than anyone trying to stop him.

Bo reached the crawler and grabbed the tailgate with both hands, hopping into the back.

No one else was there. Ammunition boxes rolled from side to side across the deck as nearby explosions rocked the suspension. A dead soldier lay across the forward bench, but Bo had reached the point where he no longer trusted dead soldiers to remain either dead or the same person.

He stepped over the body without checking.

Bolted to the rear mount was the crawler's heavy cannon. The weapon was nearly as long as Bo and considerably better educated. Warning labels covered its cooling jacket. One said CREW-SERVED WEAPON. Another said DO NOT REMOVE FROM MOUNT. A third, printed in larger letters, said AUTOMATIC THERMAL SHUTDOWN DISABLED BY UNIT REQUEST.

Bo released the mount clamps. The cannon dropped onto his arms and drove him to one knee. He grunted, dragged it upright and settled its receiver against his hip. The ammunition belt still ran back into the crawler. It lifted off the deck behind him like the tail of a very nervous metal animal.

He squeezed the trigger. The cannon tried to leave without him. Bo leaned backward and held on. A white-hot stream of bolts carved a glowing line through the parking lot, across the ice berm, through the remains of the convenience-store sign and into the village barber shop across the street. The barber pole spun once at tremendous speed before vanishing.

Bo swung the weapon the other way. The ammunition belt thrashed. Soldiers threw themselves down. Jetpack troops broke formation. A buggy that had already been wrecked exploded again, perhaps from habit.

Bo had no idea who he was shooting at. Or why.

He fired at a group running toward him, then at a group running away, then at a group standing still and pointing at the first two groups. He may have hit some of them. He may have missed all of them. Whenever his cannon passed over a target there was immediately too much smoke, ice dust, fire and airborne military equipment to determine the result.

A red bar began flashing across the weapon's heat gauge.

Bo remembered this part. The last time he had used a heavy cannon, it had overheated. Someone had shouted at him to stop. He had not stopped. Then the weapon had exploded.

This time nobody shouted at him. That seemed encouraging.

As he watched, the heat gauge turned white and the cannon began making the high, strained whine of machinery trying to explain something important to an operator who could not read. Bo smiled and kept firing until the barrel sagged toward the ground. Then it exploded.

The blast lifted Bo out of the crawler and threw him across the parking lot. He passed over a burning motorcycle, a soldier crawling on hands and knees and what might have been Lvis's second pistol. For several peaceful seconds he had a better view of the battle than anyone except the jetpack troops.

Then he landed on his back near the far ice berm. The impact knocked the air out of him. The voice in his helmet suddenly returned, grunted, came back in a falsetto tone and informed him: LEFT FOOT HAS SUFFERED A FATAL INJURY. Bo wiggled his toes. They appeared not to know about it.

He lay still and watched the sky. The first wave of jetpack troops descended into the parking lot in disciplined pairs. Their boots touched down. Their packs hissed off. They turned as one and began firing at the new wave coming down behind them.

The soldiers still in the air returned fire before landing. Some veered away. Others accelerated straight down, using the grounded troops as cover from the grounded troops. One struck the ice hard enough to disappear waist-deep and continued shooting from the hole.

More soldiers climbed over the ice berm twenty yards from Bo. They wore Vacuum Corps suits too. They opened fire on the troops already on the ground and then, apparently for fairness, fired at the troops still flying in.

The grounded troops turned to meet them. The newcomers behind the newcomers mistook this turn for an attack and fired into both groups.

A manhole cover directly in front of Bo lifted three inches. The cover slid aside. A helmet appeared, followed by a rifle and a soldier. The soldier climbed out, looked left, looked right and opened fire in both directions. More soldiers poured up behind him until they jammed in the opening and had to push one another onto the parking lot.

Bo searched his memory for a military explanation and came up with garbage. “What the…?”

A soldier beside him paused long enough to look over at Bo before somebody below him in the manhole shot him to get out.

Bo rolled onto his stomach and looked across the lot.

Something moved beside the crushed-ice ridge where the third lieutenant had kicked Oan. A hand pushed through the loose chunks. Then an arm. Oan sat up slowly, shook ice from her helmet, and looked

around as if waking late for work.

Bo's chest tightened. He raised both arms and waved. “Oan!”

He wasn’t sure if his medium range radio was still working. She did not see him, so probably not.

Oan found her sword half buried in the ridge. She pulled it free, inspected the edge, and stood.

The nearest soldier ran at her.

Oan swung once. He folded at the knees. A second came from behind; she turned and drove the pommel into his visor. A third reached for her shoulder strap and lost the hand doing it. She moved with none of the hesitation of the people trying to decide who belonged to which side. Everybody near her was dressed alike, so she treated them equally.

Bo pushed himself upright. His knees worked. His feet worked. His allegedly dead boot worked. That was sufficient medical clearance.

He ran into the melee with only only one goal: reach Oan.

The first soldier he met aimed a rifle at his chest. Bo ducked under the barrel, caught the soldier around the waist and delivered a suplex onto the ice. It was not the suflex he had promised to teach the children. It was a much better one, and Bo regretted that none of them were present to see it.

He clothes-lined another soldier. He hip-tossed a third into another manhole that had manifested before him. He leaped onto the back of a fourth, locked both arms around the soldier's helmet and rode him in a circle until they struck a parked bicycle.

Bo did not know if he was winning. Wrestling did not normally include rifles, jetpacks, decompression alarms or contestants emerging continuously from municipal drainage systems.

He caught glimpses of Oan between bodies. Her sword rose. Her sword fell. Soldiers dropped around her in rings. Each time Bo got closer, another cluster surged between them, driven by fire from the berm, the sky, the store and the manhole.

“Oan!” he shouted again.

She turned toward his voice.

For one instant he saw her face through the visor.

Then six soldiers hit her at once. Oan disappeared beneath them. Two

more jumped onto the pile. Someone fired into it. The top soldiers fired outward at other soldiers who were trying to climb on. Bodies slid down the sides and were replaced by fresh ones.

Bo charged. He shoulder-blocked the first man aside. He grabbed another by the ankle and swung him into two more. A jetpack trooper landed directly on Bo's shoulders and Bo flipped him forward into the mound.

A soldier fell against Bo from the left. Another struck him from the right. He stayed upright until a third body dropped from above and folded him beneath it.

The pile grew. A boot pressed against his helmet. An arm lay across his throat ring. Somebody's ammunition belt wrapped around his knee. More weight landed on his back in wet, armored impacts, each one forcing him deeper into the heap.

Bo tried to crawl. His hands found only space suits, rifles, limbs and hardening blood. He tried to push upward, but the bodies above him settled closer together. A visor stared into his from six inches away. The soldier inside it looked surprised, although most of his helmet was gone.

Bo could barely move.

He could no longer see Oan. He could not tell whether she was beneath the same pile or another one. He could not tell whether the soldiers around him were dead, stunned, pretending or merely waiting for somebody to explain who the enemy was.

Outside the mound, the laser battle continued. Beams flashed through narrow gaps between bodies. Boots ran past. Jetpacks roared overhead. Men shouted unit names, passwords, accusations, orders, corrections to orders and demands to know who had issued the corrections.

From somewhere under the pile, very close to Bo's right ear, a woman groaned. The sound did not come through the radio, instead it traveled through a series of helmets pressed so close together they formed a medium for sound to travel through.

“Oan?” he whispered.

No one answered.

A final body landed on top of the others. The armor compressed. The last strip of sunset vanished from Bo's view.

In the dark, unable to lift even one hand, Bo listened to the Vacuum

Corps defeat itself.

CHAPTER FORTY-EIGHT UNDER A PILE IN A TEMPORARY ATMOSPHERE

Around noon, the sun set.

The last blade of sunlight slipped behind the far wall of Valhalla and left the village in darkness. Fires still burned through three pressure domes and most of the convenience store, but they could not replace the sun. They only made the dark move.

Bo lay under the dead and went over the battle in his head.

There was not much room for anything else. A soldier's chest plate covered his face. Somebody's knee rested against the side of his helmet. Beneath his left hand was a rifle he could not pull free and beneath his right was something warm that had stopped moving several minutes before.

He began his second guessing with the store's busted airlock. Rbra had still been alive in the parking lot. Bo had been inside the store, pounding on the broken contraption. He had run all the way back to the hardware aisle for the sledgehammer. He had run all the way forward again. He had struck the door too high the first time, too low the second time and in the middle after that.

If he had gone for the sledgehammer sooner, he would have reached her sooner.

If he had picked up a different tool, he might have broken the door on the first swing.

If he had not slipped when he charged the third lieutenant, he might have knocked the man down. Rbra would not have had to keep fighting. She might not have been standing where the jetpack troops fired. She might still be alive.

Bo rearranged the battle in his mind and tried again. In the second version he found the sledgehammer before the airlock jammed. In the third he carried it with him everywhere for no sensible reason. In the fourth he hit the door once and the entire front of the store fell outward. In the fifth he reached Rbra in time but forgot what he was supposed to do when he got there.

That version felt the most accurate.

He tried to think about Oan instead. This was worse.

He had seen her stand. He had seen her sword moving through the soldiers. He had seen her disappear beneath them. Somewhere nearby, possibly underneath the same mound, she might be trapped. She might be wounded. She might already be dead because Bo had decided the fastest way to reach her was to perform wrestling moves on everybody between them.

He tried calling her name again. Only static answered.

The helmet radio had been filled with static for so long that it seemed less like interference and more like the official voice of the Vacuum Corps.

Bo decided he did not want to be awake anymore. He pulled his head back as far as the bodies allowed and struck the rear of his helmet against the ice. The helmet absorbed the impact. He did it again. The head restraint tightened automatically and displayed a warning that repeated deliberate impacts could damage government property.

Bo struck harder. The warning became red. His head remained conscious. He twisted sideways and banged the helmet against the dead soldier's chest plate. The soldier shifted and settled more heavily across him. Bo stopped before he buried himself any deeper.

Too stupid to save his friends, he thought, but not dumb enough to knock himself out. What a loser.

He closed his eyes. The darkness inside the helmet looked exactly like the darkness outside it, except that the inside darkness contained little glowing warning signs.

Then a voice broke through the static. “Bo?”

He did not answer. It might have been Rbra again. He had heard her voice when she was nowhere near him. He had followed it through an empty station that had never been empty. His memories had already killed and revived Lvis several times. Bo no longer trusted voices, faces, colors, funerals or the number of beds in motel rooms.

“Bo? Bo, if you can hear me, say something.”

It was Ricia. Probably.

Bo swallowed. “Go away.”

The radio crackled. “Where are you?”

“Somewhere you don't want to be, at the bottom of a giant pile of dead soldiers.”

There was a pause. “Which pile?”

Bo considered this. “The big one?”

Something moved above him. A body rolled away. Firelight entered through a narrow opening and flashed across his visor.

“Keep talking,” Ricia said.

“You're wasting your time. People worthy of saving are buried in the other pile.”

“Good. Keep saying stupid things. It helps me locate you.”

The weight on his back shifted. A boot vanished from beside his helmet. Then a rifle. Then a soldier whose cooling pack had frozen to two other soldiers and had to be dragged away as a unit.

Ricia worked from the top down. She used a short pry bar to separate armor plates, rolled bodies into the gaps between others, and checked each faceplate before moving on. When a soldier groaned, she tagged the suit with a blinking marker. When one did not, she used it as leverage.

At last the chest plate over Bo's face lifted. Ricia looked down at him through a visor streaked with soot. “There you are.”

“Sorry.”

“For hiding?”

“For everything. For being alive and wasting your time.”

“We don't have time for that. Give me your hand.”

Bo did. Ricia pulled while he crawled. The mound released him reluctantly, taking one of his ammunition pouches and most of the paint from his shoulder plates. He slid down the side and landed among rifles, boots and people who had stopped needing either.

Standing up made the village appear all at once. It was on fire. The convenience-store dome had collapsed into a glowing metal bowl. The barber shop burned from the inside while its pressure membrane inflated and deflated like a lung. The town hall roof had split open. Flames poured out of it in slow red folds and curled toward the ground wherever the thin local gravity permitted.

The fires had consumed enough stored oxygen to produce a temporary atmosphere around the center of the village. Smoke, soot, carbon dioxide, steam, vaporized plastic, and powdered ice drifted together beneath the cold sky. It was not breathable, but it was thick enough to

carry sound. Buildings creaked. Ammunition cooked off. Somewhere a bicycle alarm chirped hopelessly.

Bo could see no stars through the smoke. With the sun gone, everything was out of context. There were no long shadows to show the direction of the valley, no visible ridges, no light on the road. The fires made every wall look like the outside wall and every street look as if it led farther into the battle.

At least there were no moving soldiers. There were no moving military vehicles either. The parking lot contained wreckage from more units than Bo could count, all wearing the same insignia and all pointed in different directions.

Ricia turned slowly, reading information inside her helmet. “Where are Rbra and Oan?” she asked.

Bo looked toward the remains of the manager's office. Then toward the crushed-ice ridge. Then back at the pile. He shook his head.

Ricia's posture changed by less than an inch. It was enough.

“You should've left me there,” Bo said.

Ricia reached to the medical belt at her waist.

Bo expected a scanner. Instead she pulled out a syringe, slapped one hand against his thigh armor, found the flexible seam between two plates, and drove the needle through it.

“Yow!” Bo yelped, “I suppose I deserved that.”

“Yes,” Ricia said. She depressed the plunger. “It's an antidepressant.”

The medication burned cold as it entered his leg.

Bo waited. “When do I become happy?”

“That's not what it does.”

“Then why is it called that?”

“Because ‘it keeps wounded idiots moving until evacuation’ wouldn't fit on the label. Come on. We have to reach the rally point.” She grabbed his arm and led him over the edge of the body pile. Bo tried not to look down. This was impossible because looking anywhere placed bodies in view.

They crossed the parking lot and entered the alley behind the store. The half caved in walls protected them from the worst firelight. Smoke rolled

overhead in dirty sheets, briefly thick enough to scatter the beams of distant weapons moving north of the village.

A motorcycle waited beside a waste compactor. It was one of the anti-smuggling unit's machines, still painted with the unit number and a slogan about integrity. A heavy sidecar hung from the right side. Its mounted weapon had been removed, leaving an empty swivel and several loose ammunition belts.

Arles sat in the sidecar. He wore Rbra's helmet. He had opened the food port and was pushing pieces of a compressed snack bar through it one at a time. Crumbs floated inside his visor and stuck to his eyebrows.

He looked up when Bo and Ricia approached. “Oh, hey, Bo.” He chewed thoughtfully. “I didn't expect to see you again.”

Bo stopped.

Arles raised the snack bar in salute. “Congrats on surviving, by the way.”

Ricia climbed onto the motorcycle and kicked the starter. The motor coughed twice. Arles slapped the sidecar with the heel of his hand. On the third attempt it came alive with a subdued electric whine.

“Get on behind me,” Ricia said.

Bo climbed onto the rear seat. There was no room for his knees, so he placed them on either side of Ricia and held the cargo rail rather than her waist. He did not think he had earned the right to hold on to another person.

Ricia reached back, seized his wrist and pulled his arm around her armor. “If you fall off, I'm not digging you out of anything else today.”

She left the headlamp off. The motorcycle moved slowly through the alley. Ricia steered around collapsed walls, abandoned bicycles, and cooling sections of armor visible only to her. Bo saw nothing beyond the faint glow of the instrument panel. Arles saw even less, but this did not prevent him from giving directions.

“Left here,” he said.

Ricia turned right.

“Don’t blame me when they melt your face off.”

Beyond the alley they crossed a gravel street. The tires crunched loudly in the new atmosphere. Ricia coasted whenever possible and used the motor only to climb over drifts of shattered ice.

“Why don't we use the lights?” Bo whispered.

“Because the battle moved north,” Ricia said. “Somebody is still shooting at somebody else, and I don't want either somebody to see us.” She tapped the side of her helmet. “Thermal imaging. I can see enough.”

Bo looked over his shoulder. Through the smoke he saw distant white flashes climb the northern ridge. A few seconds later the ground trembled beneath the motorcycle. Whatever had happened in the parking lot had not ended. It had merely grew bored and moved on.

“We should be safe for the time being,” Ricia said.

Nobody pointed out that this was the least reassuring phrase in military history.

The medicine had begun doing something. Bo was not happy. Rbra was still dead. Oan was still missing. Ary was still buried in the cemetery above the village. But the thoughts no longer struck him all at once. They waited in a line, which was somehow worse and also more manageable.

“Where are we going?” he asked.

“Utnam's house.”

From the sidecar, Arles said, “I hear he has a nice lunch buffet set up for us.”

Ricia accelerated slightly.

Arles finished the snack bar and searched his pockets for another. “By the way, you got any more of those drugs you gave Bo?”

“Shut up, Arles,” Ricia and Bo said together.

Arles smiled inside Rbra's helmet.

The motorcycle kept moving through the sunless village, slowly and without lights, carrying the three of them toward whoever else made it to the rally point.

CHAPTER FORTY-NINE CATACOMBS MAP

Utnam's basement was larger than his house.

The house above it was a modest archaeologist's retirement home containing two bedrooms, a kitchen, a sitting room, and several shelves of objects Utnam claimed had no value despite keeping each one behind armored glass. The basement extended under the neighboring lots, the street and possibly the post office. Its ceiling was supported by black iron pillars sunk directly into the ice.

Serj and Moe stood at a long worktable in the center of it, bent over a map so large that its corners hung toward the floor.

They had weighed the map down with ammunition magazines, a fossilized vertebra and an empty liquor bottle that appeared to be older than Jupiterian civilization. A portable lamp cast a yellow circle across the middle. Everything beyond the circle disappeared among shelves, crates, excavation equipment and pieces of Mooninite history awaiting either identification or a sufficiently gullible buyer.

Serj dragged one finger along a line on the map.

Moe shook his head and moved a magazine onto it.

Serj moved the magazine away.

Moe put it back.

The basement door opened. Utnam came down first carrying a dim hand lamp. Ricia followed, then Bo, then Arles, who still wore Rbra's helmet and had acquired another snack somewhere between the motorcycle and the stairs.

Serj straightened. “That's it?”

Ricia looked around the basement as though someone else might be hiding behind a jar of teeth. “That's who I found.”

Serj counted them twice. “Rbra?”

Ricia shook her head and Bo lowered his eyes.

Nobody asked again.

“Oan? Rothy?” Moe said.

Bo shook his head.

No other names that they didn’t already know the fate about was asked.

Ricia removed one glove and began entering names into the casualty list on her wrist unit. “I didn't see them moving. That isn't the same as confirmed.”

“It usually becomes the same after a while,” Arles said.

Moe looked at him. “Whose helmet is that?”

Arles touched it as if he had forgotten. “She didn’t need it any more, and I did. Sue me.”

Bo stared at the blackened visor. Rbra's name had been scratched into the lower rim. The antidepressant had not made him happy, but it kept the sight from breaking him into as many pieces as it should have.

Ricia finished the list. “Rothy is the only one unaccounted for.”

“She's still alive,” Bo said.

Moe looked across the map. “How do you know that?”

Bo had no idea how he knew that and wasn’t sure why he’d said it in the first place. Maybe the part of him that still hoped was rearing its ugly head. He tried his best to ignore it.

Serj answered for him. “Because someone has to survive and file the report."

Moe gave a tired laugh. Arles laughed because Moe had. Even Utnam smiled faintly. Bo did not.

Utnam closed the basement door and slid a metal bolt into place. “You do not have long,” he said, hobbling over with his cane keeping him upright.

“How long?” Moe asked.

“Long enough to leave if you stop asking how long. The soldiers will begin searching houses as soon as they finish killing one another. My house will be among the first. I am Jupiterian, I have worked with the military and your stolen motorcycle is currently hidden under a blanket in my shed.”

Arles snorted.

Utnam ignored him. “They have thermal imagers. They will see six warm bodies standing in my basement and one old warm body lying to them upstairs. You need to move.”

Ricia looked toward the dark edges of the room. “Move where exactly?”

“Into the tunnels.” he said, pointing at the map.

Serj tapped the map. “Over here. We were just discussing our route when you arrived.”

Bo stepped closer. He had assumed it was a map of the village. The six surface domes occupied a small circle near the center, drawn in red pencil. Thin gray streets radiated away and stopped almost immediately. Beneath them, black and blue lines tangled across the paper in every direction.

Some lines were straight. Others wandered. Several doubled back on themselves or ended in circles filled with tiny symbols. The longest continued beyond the map's edge as if the person drawing it had run out of paper before the tunnels ran out of moon.

Bo found the scale at the bottom. The map covered twenty kilometers from one side to the other. He looked at the basement walls, then back at the map. “All of this is under us?”

“Around us, mostly,” Utnam said. “Under the surface village, around the valley, through the ridge and into the mountain. Some passages are natural. Some were melted. Some were excavated before the Jupiterians arrived. No one knows all of them anymore.”

“And the caves?” Ricia asked.

Utnam pointed to the shaded clusters. “That is where the Mooninites actually live.”

Bo stared at him. “There are people under the village?”

“Under the western massif to be precise. The surface domes are a market, postal address, traffic diversion, tax location and something for orbiting surveyors to photograph. Very few Mooninites sleep there.”

Moe leaned over the map. “How many people live in these caves?”

“It depends which census you intend to invade with.”

Serj placed one finger on Utnam's house and traced a blue tunnel toward the eastern edge. It passed beneath two inhabited caves, crossed a vertical shaft and split into four branches near the boundary of the paper. “This one gets us outside the village perimeter,” he said. “Then we take the north branch.”

“To where?” Ricia asked. “The weather station?”

Bo looked at the map without seeing it. “Why bother?” he said. “We're doomed anyway.”

Serj looked at Ricia.

Ricia checked the time on her wrist unit. “Give it another thirty minutes. The drugs haven't fully kicked in.”

Everyone in the room except for Serj felt the same as Bo, but they we’re able to admit it.

Serj folded his arms. “Listen. We are not doomed. The deal is still on. We can still make this work.”

Moe stared at him. “The deal? Seriously? What planet do you think you were born on?”

Serj ignored him. “Ten million in cash,” he said, “Same buyer, new location. We can use the tunnels to get beneath the patrols, once we’re top side we can make the exchange.”

“Make the exchange with what?” Moe spread both hands over the map. “We never reached the cache. We never got this mysterious artifact. We don't have the crawler, the equipment or most of the squad. Unless the buyer is collecting dead smugglers, we got nothing he wants.”

“Let me worry about the artifact.”

Moe studied Serj's face. “That's what you said last night.”

“And it remains excellent advice.”

Bo looked from one to the other.

Moe crossed his arms. “So, who's the buyer? Anyone I know?”

Serj hesitated just long enough for everybody to notice. “Colonel Fodder. Camp Rag.”

The name disturbed something inside Bo's damaged memory. A camp. A spire. An empty station. A reactor knocking from the inside. A voice telling him to run.

Moe shook his head. “Camp Ragnarok was overrun by Saturnians years ago. What’s wrong with you, man?”

Serj shook his head more firmly. “That's not true. I don't know where that rumor came from. You know how bad intel has become lately. Someone shouts Saturnian and an entire brigade comes down on your ass.”

“Two actually,” Bo muttered.

Utnam stepped into the lamplight. “I can verify that Camp Ragnarok has not been overrun. I was there only days ago. I spoke to Colonel Fodder in person.”

Ricia looked at him. “You went to a military camp while arranging an illegal artifact sale to its commanding officer?”

“When you phrase it that way, it sounds less forthright.”

“I’m assuming the artifact is something you stole from the Mooninites?” Moe asked.

“Colonel Fodder knows what he wants. Ownership is a philosophical condition imposed on objects after discovery.”

“So, yes then.”

Utnam grinned. “Among archaeologists, it’s called avoiding the question.”

Bo leaned against the table. The map wrinkled beneath his hand, shifting whole tunnels several meters to the north. “Was Rbra supposed to come with us?” he asked.

Nobody answered immediately.

Serj placed a hand over the wrinkle and smoothed the map. “Rbra knew the risks.”

Bo pulled his hand away.

A knock sounded upstairs. It was not loud. The basement made it enormous. Everyone stopped moving. A second knock followed, three measured blows against Utnam's front door.

The portable lamp hummed. Somewhere among the shelves a small mechanism ticked with archaeological patience.

Utnam extinguished the lamp. Darkness covered the map, the table, and the faces around it. “You need to hurry,” he whispered.

A white beam swept briefly across the high basement window. It passed over the glass, returned and remained there.

Utnam moved through the darkness without hesitation. Crates scraped. A latch clicked. A narrow door opened between two shelving units, revealing a stairwell that descended beneath the basement.

Cold air rose from it. The steps were cut directly into blue-black ice.

There was no railing and no visible bottom. A string of dead utility lamps followed one wall until it vanished into the dark.

Moe peered down. “How far down does this go?”

“Far enough that thermal imaging will confuse you with the surrounding rock,” Utnam said. “Stay on the stairs. At the first landing, take the passage marked with three circles. Do not take the one marked with two.”

“What's in the one with two?” Arles asked.

“Mooninites.”

“What's wrong with them?”

“They do not like visitors who cannot count to three.”

The knocking came again. This time a voice followed it, amplified through an external helmet speaker. “Vacuum Corps inspection. Open the door.”

Serj grabbed the map from both ends at once, intending to roll it up. Moe pulled the liquor bottle free before it started moving.

“Leave the map,” Utnam said, putting his hand down.

Serj shook his head, “But we need it.”

“It identifies every inhabited cave for twenty kilometers. If they find it missing, I become a collaborator.”

Serj looked toward the basement ceiling. “If they find us, you become one anyway.”

Utnam took the map from him, spread it across the table and threw the weights back onto its corners. The eastern tunnels were now slightly crooked where Bo had leaned on them.

Ricia entered the stairwell first. Moe followed with the hand lamp. Serj went next. Arles paused long enough to take the liquor bottle holding down the western corner.

Bo stood at the top of the steps.

The darkness below seemed thicker than ordinary darkness. It had depth and temperature. It smelled faintly of minerals, cold machinery, wet stone and air that had been breathed by other people before Jupiterians knew Callisto existed.

Utnam pushed him gently between the shoulder blades. “Go.”

“Aren't you coming?”

“I have to answer my door.”

“What will you tell them?”

Utnam smiled. “Something archaeological.”

Bo stepped down. Utnam closed the narrow door behind him.

CHAPTER FIFTY EXTRA VITAMINS - CAVE LIFE - THE ARTIFACT

The first few days in the caves were not so bad.

No troops followed them through Utnam's basement. No voices came from the stairwell, no helmet lamps appeared behind them, and no thermal patrol drilled through the ceiling. After the first hour, even the sounds above were gone.

Serj said they were too deep for radio signals from the surface to reach them.

Rothy was not there to confirm it. Nobody said anything but they were all thinking it.

The caves were not empty. They contained an entire glowing world that had spent centuries learning to live without the sun.

Pale fungus climbed the ice walls in shelves, spirals, fans, and long soft curtains. Blue bacterial mats spread across the low ground, turning every wet hollow into a field of cold stars. Green threads ran through cracks in the ceiling. When someone passed beneath them, the threads brightened for several seconds, tracing the group's progress long after they had moved on.

The light was never strong. It was enough to reveal color and shape, but not enough to promise distance. Anything beyond thirty feet became an arrangement of violet slopes and floating points of blue.

The air was cold, humid, and breathable.

Ricia tested it repeatedly during the first day. Oxygen was a little high. Carbon dioxide was a little low. There were spores everywhere, but only three kinds were immediately dangerous, and those glowed orange in a way that made them easy to avoid.

Nobody could explain why the solid ice walls did not melt. Water trickled over them. Ferns grew from them. Cool air passed between them. Their surfaces remained hard and cold, sweating only where black mineral veins broke through. Arles said the ice knew what it was doing and advised everyone not to look it directly in the eyes.

After a few hours, they stopped wearing their helmets and clipped them to straps across their backs. Serj insisted they remain within reach in case the cave atmosphere changed suddenly. Moe pointed out that an

atmosphere generally announced such changes by killing something smaller first.

From then on, everyone watched the insects.

The terrain made watching anything difficult. There were hardly any flat places. The main cave followed a crack in Callisto's crust and zigzagged continuously, descending into gullies before climbing over ridges of fractured ice. Small crevasses opened without warning between slabs. Some could be stepped over. Others vanished into darkness and continued making water sounds for a long time after a loose stone was dropped into them.

The ceiling changed height with every few steps. At one moment it pressed low enough to scrape their backpacks. Two paces later it opened into a chamber so tall that the glowing plants could not reveal the top. Everyone learned to walk bent slightly forward, which protected them from the low sections and made them look foolish in the high ones.

Ricia managed the hike better than any of them expected. She adjusted the mechanical joints of her artificial leg for climbing and used a collapsible pole on the descents. The foot sometimes slipped on wet bacterial mats, but it did not get tired, cramp or complain. Ricia said this made it the healthiest member of the group.

Bo offered to carry her medical pack.

She let him carry it for twenty minutes, until he tripped into a patch of orange fungus and had to be decontaminated with half the pack's supplies.

After that he carried Arles's liquor bottle.

Ferns, lichens and small plants grew wherever water gathered. Their colors belonged to no respectable surface ecosystem. Leaves shimmered magenta and silver. Clear stalks held black blossoms that reflected light they did not receive. Tiny red vines curled toward body heat and withdrew when touched.

Bo wanted to taste all of them. The first fern tasted like burnt wire. The second tasted like a dirty spoon. A purple lichen numbed his tongue for an hour and caused his helmet to identify every object he looked at as a potential chair. By the fourth attempt, Ricia stopped testing his samples for poison and began testing Bo afterward.

“None of it tastes like candy,” he complained.

“That is how nature warns you it isn't candy,” Moe said.

Arles ate a red vine. It curled around his tooth and remained there until evening. He said it was harmless.

No one talked about where they were going.

They talked about where they were not. They were not on the surface. They were not in the village. They were not in the parking lot piled high with bodies. They were not beneath jetpack troops, in front of anti-smuggling buggies or trapped inside a convenience store whose candy aisle had been converted into a mound of sticky garbage.

Every time someone mentioned the fighting, the conversation stopped at the names of those who had not escaped it. Then they walked some more.

Dragonflies lived in the larger chambers. Their transparent wings caught the fungal light and flashed blue as they moved. Some were the length of Bo's hand. They hovered in front of faces as if examining the newcomers, then darted away toward the streams.

Gnats gathered around warm equipment and followed the group in shifting clouds.

Bo had never seen either insect. Moe had only seen pictures. Ricia knew them as disease vectors from medical manuals. Serj kept swatting at them until one gnat landed on his nose and glowed green.

Only Arles seemed unconcerned. “Harmless,” he said.

“How do you know?” Ricia asked.

“I've been bitten by worse.”

This was not evidence, but it was the most anyone had.

For the most part, the cave system was one long broken passage following the ancient crack. Smaller branches extended from it on both sides. Some sloped upward toward inhabited caves. Others descended into black water or narrowed until even the gnats had to turn sideways.

Small wooden bridges crossed the central crevasse from time to time. They had been carved by hand from unknown timber and repaired so often that none of the original wood remained. The railings were decorated with Mooninite faces, animal shapes, family marks, and warnings to travelers. Serj could read none of them, so he translated every warning as BRIDGE SAFE.

Arles refused to cross until Moe went first.

Moe bounced in the middle to prove its strength. The bridge lost a few planks in the process but survived and Arles swore at him on the far side.

Little streams of meltwater trickled down both walls of the cave. They gathered in grooves cut into the ice, ran beneath roots and fungal shelves, and fell into the central crevasse in thin silver lines.

On the second day, their canteen water ran low.

Ricia knelt beside one stream and filled a sample tube. She tested it for microbes, minerals, toxins, radiation, parasite and dissolved machinery.

The analyzer chirped. “Safe,” she said.

While everyone was busy filling their containers Ricia frowned at the display. “It also has extra vitamins.”

Moe stopped drinking. “Why?”

“Water doesn't normally have vitamins,” Serj said.

“I know.”

They all looked upstream. The water emerged from behind a curtain of luminous fungus and a small hand-painted sign none of them could read.

Arles spit out his mouthful. “Vitamins aren't healthy. Or at least since the Department of Public Health was dismantled for not being sufficiently loyal to Jupiter.”

The others ignored Arles and drank anyway.

They moved out with Serj in the lead. He stopped often to get his bearings. He called these stops map checks, although they had no map. He would study the shape of the walls, examine scratches on the floor, peer into two or three side passages then choose the one he had been facing when the inspection began.

He wanted the others to believe he knew exactly where they were, yet he did not.

By the third day even Bo could tell.

“The main passage had three circles,” Ricia reminded him at one fork.

“That was at the first landing.”

“This fork has three circles too.”

“They're different circles.”

Moe pointed toward another wall. “I remember a cave shaped like a foot near the south branch.”

“All caves are shaped like feet if you look from the correct direction,” Serj said.

Bo tried to help. “I remember leaning on the map.”

“We'll be sure to put that in our report,” Moe said, “sub private paper weight.”

Their combined memory was not useful.

The Mooninites they met were confused to see them. Gardeners tended beds in the side passages, growing pale tubers, broad black leaves and clusters of round fruit that pulsed when ripe. The gardeners stared at the armed Jupiterians, then at one another, then usually decided that asking questions would complicate the transaction.

They traded food for trinkets. Moe exchanged a folding knife for a sack of blue roots. Ricia traded a packet of sterile needles for a couple glowing melons. Serj issued handwritten IOUs for mushrooms, cooking oil and directions. The Mooninites examined his signature carefully and accepted the papers as kindling.

Arles traded nothing. He simply wandered into gardens, returned with produce and claimed it had grown over the fence into no man’s land.

Moe cooked their meals on a small butane heater. He sliced whatever they had obtained, boiled what looked boilable, roasted what tried to crawl away and seasoned everything with packets salvaged from his pockets. He produced stews, fried roots, fungus cakes and something like an omelet despite nobody having seen an egg.

The meals were delicious. Bo ate until Ricia reminded him that his new anatomy was still under advisement.

On what they believed was the fourth day, the main cave narrowed between two leaning walls of ice. A metal hatch stood behind a curtain of roots appearing completely out of place.

The hatch was rectangular, machine-cut and stamped with faded military markings. Behind it waited an artificial vertical shaft lined with old concrete. A steel ladder climbed the wall and disappeared upward beyond the reach of their lights.

Serj scraped moss from the hatch frame. Beneath it was a serial number

worn nearly smooth by time. “This is it,” he said with a smile.

Moe looked up the shaft. “We're meeting the buyer here?”

“No. We're underneath one of my secret caches. The artifact is up there.”

Everyone stared at him.

“Wait here,” Serj said. He fitted his helmet, tested the ladder and began climbing. His light rose steadily through the shaft until it became a white speck. Then it vanished.

They waited. Moe inspected the hatch. Ricia rested her leg while Arles opened the liquor bottle and offered it to Bo. Bo declined, then accepted when he remembered the water already contained unexplained vitamins. More of the booze ended up shooting out of his nose than down his throat. He asked for seconds. No one mentioned the bottle had been empty in Utnam's map room when Arles had swiped it.

One hour passed. Then another.

From somewhere high in the shaft came scraping, a heavy impact, and a muffled curse. Soon Serj's light appeared again. He descended slowly, keeping one arm close to his chest. When he stepped off the ladder, his left thigh pocket bulged. “Got it,” he said.

Moe held out his hand. “This ought to be good. Let me see it.”

Serj made sure the pocket was zippered and the Velcro flap secured over it. “Sorry, not allowed. It’s part of the deal.”

“Lemme get this straight. You climbed into a secret cache none of us knew existed, disappeared for two hours and came back with something hidden in your pocket?”

“Affirmative.”

“Well, what the heck is it?” Ricia asked, more than a little annoyed.

Serj sighed. “Sorry, I can't tell you that either.”

Arles leaned closer. “Did I see a wiggle under that flap. Got something alive in there, serge?”

Everyone took one step back.

Now Serj looked annoyed. “No. Nothing alive in my pockets. Take a step back.”

“So, what can you tell us?” Moe asked.

Serj looked toward the passage ahead. “We're going to Camp Rag. Since the buyer can't come to us, we'll go to him.”

Nobody was happy with the answer.

Serj started walking anyway. After a moment, the others followed.

CHAPTER FIFTY-ONE LOTS OF DRILLS - PR REPORT

Up top, in the ruins of the village, the vacuum had reasserted itself.

The temporary atmosphere of destruction was gone. Smoke had thinned into black ribbons and drifted away across the valley. Steam froze into glittering dust. The last open flames collapsed as stored oxygen ran out, leaving buildings to smolder privately inside whatever sealed rooms remained.

Without air to carry sound, the village became peaceful.

Wrecked buggies stood where they had stopped. Motorcycles lay scattered along the streets. Bodies in identical Vacuum Corps armor covered the parking lot, the ridge, the roofs and the crater where the convenience store had been. A few damaged jetpacks continued firing short corrective bursts, dragging their former owners slowly across the ice.

Captain Rchibald arrived after the dangerous bit was over. His crawler rolled into the village from the south with its lights blazing and its identification beacon broadcasting on every military channel. Two armored escorts traveled in front of him, two behind, and a public relations buggy followed at a respectful distance with three black and white camera operators.

Rchibald had reluctantly commanded the unnamed third lieutenant from a desk safely in orbit. During that time he had approved the lieutenant's requests, rejected his explanations, ignored his reports and occasionally remembered that he was technically an officer.

Now the infamous third lieutenant was spread across the parking lot in pieces too numerous for a proper salute.

A recovery sergeant led Rchibald to the largest piece.

The third lieutenant's helmet lay beside the remains of a troop crawler. Laser fire had cut through the crown and left one side blackened. Frozen blood coated the throat ring and filled the scratched grooves around the lieutenant's name.

Not trying to hide his smirk, Rchibald picked it up.

“Did he die bravely?” the public relations officer asked.

Rchibald turned the helmet in his hands. “Extremely bravely.”

“Saving civilians?”

The captain looked at the ruined village. “If any are found, yes.”

The PR officer entered this into her report.

Rchibald tucked the helmet beneath one arm. It was technically evidence, government property and the sealed remains of a subordinate officer. It was also an excellent souvenir.

The lieutenant had spent weeks pursuing the smugglers. He had lost soldiers, vehicles, aircraft, supplies and the patience of several departments. Now that he was dead, the pursuit could be declared successful without any risk that he would contradict the official version.

Captain Rchibald inherited the operation. He also inherited the credit.

A communications specialist erected a long-range dish beside the post office crater. It tilted toward the carrier until a green connection light appeared, signaling the Arley Mith was now passing overhead.

Rchibald stood where the camera crews could record his profile, held the third lieutenant’s helmet against his hip and cleared his throat.

Lieutenant Colonel Atton appeared on a black and white CRT being held up by a corporal. The colonel was seated in the carrier's tactical command room beneath a wall display showing the village as a blinking problem on a pale moon. Officers moved behind him carrying tablets, revised casualty estimates and cups of coffee labeled with ranks higher than their own.

“Captain Rchibald,” Atton grunted. “Report.”

Rchibald lowered his head the exact amount required to suggest a bad attitude without allowing the helmet under his arm to slip. “Sir, a third lieutenant died in close combat while attempting to contain the Saturnian attack.”

“Bravely,” the specialist added, poking her head into view of the camera.

Atton leaned back. For a moment the colonel said nothing. “You mean that third lieutenant?”

“Yes.”

Atton relaxed his shoulders. “Well,” he said, “seems like a watershed moment.”

“Yes, sir. We can put that chapter behind us now.”

“So, he won't be sending any more reports then?”

Rchibald glanced down at the helmet. “Lord help us all.”

“What?”

Rchibald stiffened and looked back at the camera. “No, sir.”

Atton closed his eyes and allowed himself a brief private expression of relief. "Very good. Uh, I mean terrible. Proceed.”

The captain turned slightly so the camera could see the destruction behind him. “Our preliminary investigation indicates that the village assault was carried out by a crack team of Saturnian super soldiers disguised as smugglers.”

Atton looked at the tactical display. “How crack?”

“Extremely crack.”

“And super?”

“The surviving witness statements vary, but estimates place their strength somewhere between one and two thousand. They destroyed multiple enforcement units, ambushed reserve brigades, infiltrated municipal infrastructure and caused loyal Vacuum Corps soldiers to mistake one another for enemy combatants.”

“How did they do that?”

Rchibald had prepared for this question. “Advanced Saturnian confusion tactics.”

Atton nodded slowly. “Sounds like something Saturnians would develop.”

“Their leader may possess telepathic command abilities,” Rchibald continued. “One operative carries a laser sword. Another uses advanced hand to hand combat techniques similar to wrestling. A third is believed to be an experienced demolitions expert immune to grenades.”

Atton looked offscreen. “Are we writing this down?”

Several officers assured him that they were.

“Stop it!” Atton cried off camera. After a short pause he reappeared. “Captain, where is this crack team now?”

“In the caves beneath the village. Or maybe to the west of it. Or both. They are very sneaky.”

The blinking problem on Atton's wall display expanded downward, became a column, and disappeared through the bottom of the map.

“How extensive are these caves?”

Rchibald looked toward Utnam's house on the edge of the village. It was a smoldering pile of collapsed walls and expensive collectibles. Soldiers moved in and out of the wreckage carrying boxes, shelves, pottery fragments and anything that resembled a map.

“Extensive, sir. The surface settlement was apparently a decoy. The native population lives in a network of tunnels and inhabited caverns extending at least twenty kilometers in six directions. Possibly farther.”

“You allowed Saturnian terrorists to escape into an illegally populated underground region?”

“The third lieutenant allowed it shortly before dying, sir.”

“Bravely,” the specialist added again.

Atton narrowed his eyes. “Of course he did.”

“We managed to apprehend a Jupiterian archaeologist who was hiding the underground access point. Utnam Ynch. He confessed everything.”

“Good. What did he confess?”

Rchibald consulted the interrogation summary on his wrist display. “He confessed that the caves exist, that Mooninites live in them, that he had met the fugitives before and that military officers frequently misunderstand archaeology. He also supplied several statements concerning colonial occupation, property rights and our inability to distinguish a storage jar from a hole in our butts.”

“Did he reveal the terrorists' ultimate destination?”

“Not in terms useful to operations.”

Atton frowned. “Where is he now?”

“His brain is being examined for treason.”

The colonel brightened. “Results?”

Rchibald checked another line. “Inconclusive.”

“Try a different interrogation technique.”

The captain muted his microphone and looked behind him where a medical crawler was parked. An interrogation officer stood in its open

rear hatch holding a metal tray. He saw Rchibald and shook his head.

Rchibald reopened the channel. “Unfortunately, sir, there is not much of the archaeologist's brain left to examine.”

Atton considered this operational limitation. “Then examine the rest of him.”

“Already on it, sir.”

The colonel stood and approached the camera transmitting his image. His face grew very large in the screen and turned sideways 20 degrees counter clockwise. “How do we stop these Saturnian terrorist smugglers?” he asked.

Rchibald had prepared for this question too. He turned and pointed toward the ground beneath the village. “With drills, sir.”

Atton stepped back from his camera and waited.

“Lots and lots of drills,” Rchibald continued.

The colonel's expression changed. Rchibald recognized the look. It was the face of a senior officer encountering a plan simple enough to approve immediately and expensive enough to justify his rank. “What kind of drills?” Atton asked.

“Mining drills. Construction drills. Bore crawlers. Penetration rigs. Thermal lances. Anything capable of making a hole in ice, rock, concrete or native infrastructure. We drill shafts into the tunnel network, insert troops at multiple points, and drive the Saturnians toward a containment zone.”

“What if you hit inhabited caves?”

Rchibald looked toward the PR officer. She raised her clipboard and pointed at some squiggly lines on it. “Uh,” he replied, “We can call them, uh, suspected support caverns.”

The specialists looked at her clipboard and shook her head vigorously.

“Excellent,” Atton said. “How many drills do you need?”

Rchibald looked across the valley. The village covered six acres. The tunnels covered twenty kilometers and extended off the only available map. He did not know the number of drills required to solve that problem. He chose a number large enough to prevent anyone from noticing. “All of them, sir.”

Atton smiled. Behind him, officers were already moving. Orders crossed

the carrier. Cargo manifests opened. Engineering units received alerts. Machines assigned to runway repair, ice mining, reactor maintenance, geological surveys and plumbing emergencies were transferred to Operation UNDERGROUND JUSTICE before their current operators knew they were missing.

“I'm sending them down as we speak,” Atton said.

A new set of lights appeared in the black sky above the village.

Captain Rchibald looked up. Dropships descended from the carrier in long, orderly rows. Beneath them hung drills of every size, from hand-operated augers to machines large enough to swallow a house. Their navigation lights reflected across the dead village and glittered from the frozen blood on the third lieutenant’s helmet.

With a wide smile, Rchibald lifted the helmet so the camera could see it. The operation had cost him nothing so far. It was already the greatest victory of his career.

CHAPTER FIFTY-TWO GOOD LUCK CHARM - WATERFALL TO SUBWAY

A couple of days after Serj retrieved the artifact, the caves came to an abrupt end.

The main passage turned once around a blue wall of ice and disappeared into a cave-in.

It was not a clean collapse. Boulders of mixed composition filled the crack from floor to ceiling: black volcanic rock, pale mineral blocks, blue ice, old concrete and pieces of something metallic that had rusted before being trapped there. Smaller stones packed the spaces between them. Ferns grew across the lower face, suggesting the obstruction had been there longer than any of them had been alive.

Water continued to trickle beneath it. The little stream ran down the passage, spread across the floor and vanished under the lowest boulders. Its sound continued beyond the collapse, faint but unmistakable. Somewhere on the other side, they assumed the cave reappeared.

Moe put one boot against a boulder the size of a refrigerator and pushed.

Nothing happened. He leaned harder. The boulder remained part of Callisto. “Now what?" he asked.

Serj examined the wall. He looked up, then left, then right, as though a convenient doorway might reveal itself out of professional respect. Then he looked at Bo and smiled.

Bo looked behind himself.

Only glowing fungus occupied that part of the cave. It did not appear to be carrying demolition equipment.

Bo looked at his suit to see if was sporting a laser mark. “What?”

“Come here,” Serj said.

He took Bo several steps away from the others, which in the narrow passage meant they could still hear every word. Serj placed both hands on Bo's shoulders. “I'm counting on you.”

Bo blinked. Nobody had said this to him since his substitute-teaching assignment, and those people had been children who thought he could remove his own brain through a laser hole.

“For what?”

“To use your special skills and find us a way through this cave-in.”

Bo studied the boulders. “Special skills?”

“Yes.”

“Like wrestling moves?”

Serj nodded. “However you want to term it. Do your thing.”

Bo had never wrestled a cave-in. It seemed unfair. The cave-in had more than one body, none of them had shoulders, and most of its weight was outside the approved division.

Still, Serj was counting on him.

Bo shrugged and approached the rocks. He tested the structural integrity of the first boulder by slapping it twice. It sounded like a boulder. He tested another by kicking it. It hurt his foot. The boulder felt nothing.

He put both arms around a narrow column of ice and attempted a waist lock. The column remained calm and technically defeated him. Bo moved along the face of the collapse, pushing, pulling, knocking, listening and occasionally asking individual rocks whether they were loose. None admitted it.

Moe sidled up beside Serj.

Together they watched Bo climb onto a slab, crawl beneath an overhang, strike a stone with his elbow and drop the stone on his other elbow.

“Testing my theory are we?” Moe asked.

“Not testing,” Serj said. “Putting it into practice.”

Bo wedged his head between two rocks, decided against it and backed out.

Serj folded his arms. “Bo is our little good-luck charm.”

Moe watched Bo attempt to lift the refrigerator-sized boulder from the wrong side. “And if he doesn't make it?”

“Then it wasn't meant to be.”

Ricia looked over from where she was adjusting her artificial leg. Her expression suggested she had heard them. Serj responded by studying the ceiling with great interest.

Bo climbed higher. The cave-in sloped steeply toward the center. Meltwater had coated the lower rocks with a thin blue bacterial film. Bo

planted one boot on it, reached for a handhold, and immediately lost both.

He slid backward with his arms windmilling. His shoulder struck a boulder, flipped sideways, then his whole body bounced from one slab to another and landed on his back in the little stream.

The stream was much deeper than it looked. What had appeared to be three inches of glowing water was a narrow channel hidden between shelves of ice. Bo dropped through the surface until only one hand remained visible. The current caught him and his hand vanished beneath the boulders. Bo was gone in the blink of an eye.

For a moment nobody moved.

The stream continued trickling with insulting innocence.

Ricia looked at Serj and shook her head.

Serj opened his mouth.

Arles did not wait for orders. He fastened the strap on Rbra's helmet, tucked the liquor bottle inside his coat, ran three steps then jumped feet first into the stream. The water swallowed him. His helmet clipped a rock with a hollow clang and then he too was whisked under the cave-in.

Moe turned to Serj and gestured toward the opening. “After you.”

Serj shook his head. “You know the route better.”

“You don't know the route at all.”

“Which makes your knowledge superior.”

Moe cursed under his breath then sat down at the edge. After a deep breath he sealed his helmet then lowered both feet into the channel. The current seized him before he finished reconsidering. He disappeared with a shout that became bubbles.

Ricia put on her helmet carefully. She locked the throat ring, checked the seals, folded her medical pack against her chest and backed into the water one deliberate step at a time. Her artificial foot found the bottom. Her natural foot did not. The current turned her around and placed her on her backside.

“Oh,” she said, before disappearing beneath the surface.

Serj stood alone before the cave-in. He looked back along the glowing passage. It was quiet, breathable, full of edible plants, safe water, and Mooninite settlements whose inhabitants had not yet tried very hard to

kill him.

He looked at the stream. From beneath the boulders came a distant metallic crash, followed by what sounded like Arles cheering. Serj sealed his helmet and jumped in.

The underground river was swift and cold. It dragged Bo through a space too narrow to swim and too wide to brace against. His shoulder lights strobed across stone, ice and concrete. Every surface appeared directly in front of his face and struck him before he could decide what it was.

A boulder hit his left hip. Another caught his backpack. His helmet bounced along the channel roof hard enough to fill his display with warnings. The current rolled him over, pulled him feet first through a submerged gap, then turned him around and sent him headfirst through the next one. His suit inflated impact cushions around his ribs which made him wider and caused additional impacts.

Ahead of him, Arles's boots flashed in the light. Behind him, something that might have been Moe collided with his legs. The river mixed them together, separated them and recombined them in new orders whenever the channel bent.

The boulders were brutally hard. Everyone got smacked around real good.

Just when Bo thought the passage was widening, he heard rushing water ahead. The sound traveled through the river and into his suit as a deep vibration. It grew until his teeth rattled.

Then the channel opened wide. There was no stone in front of him. There was no stone beneath him either.

Bo shot out of the cave-in and into empty air. For one long instant he was weightless inside a dark chamber. Water spread around him in shining fragments. His shoulder lights caught Moe tumbling to his left, Ricia below him and Arles upside down above everyone with both arms raised in celebration.

Then gravity remembered Callisto was still there and tugged them all down over an ice cliff in a waterfall.

A deep pool waited below. Bo struck it back-first and vanished beneath the surface. Cold water filled the gaps around his armor. He sank, kicked, found no bottom and let the suit's emergency buoyancy pull him upward. He broke the surface beneath falling water.

Moe surfaced nearby, coughing inside his helmet. Ricia appeared closer

to shore and paddled with one arm while her artificial leg kicked in a perfectly straight line. Serj came up beside the cliff, breathing heavy. Arles did not surface.

They waited.

Rbra's helmet floated up, empty.

Then Arles burst from the water ten feet away, gasping and laughing. He had been the only one who had not managed to lock his helmet before the river took him. Rbra's helmet drifted beside the waterfall while he swam after it with the liquor bottle still tucked safely inside his utility belt.

He reached the sloping shore last and waded out of the pool hooping and hollering with gusto. Water poured from his sleeves, boots, pockets, hair and several openings Ricia said should not exist in a functional pressure suit.

“That was great!” he shouted, before collapsing onto the wet concrete. He lay there unconscious for a couple of minutes before coming too. He rolled onto his back. “Remind me never do that again.”

The others lay where they had reached shore and breathed deep and slow. Their shoulder-mounted lights swept across the chamber as they scanned their new surroundings. It was a cave of sorts, but not a natural one.

They were inside a circular tunnel made of concrete, approximately nine meters in diameter. Its curved walls were smooth except for seams between poured sections and long mineral stains descending from the ceiling. The waterfall emerged through a jagged wall of ice that sealed one end.

The pool filled the bottom third of the tunnel. Water lapped against the sloped concrete ledges on both sides. Large grated drains drank the overflow and carried it somewhere deeper with a continuous hollow roar.

In the opposite direction, the tunnel continued straight beyond the reach of their lights.

There were no plants ahead. No bridges. No Mooninite markings. Only evenly spaced metal brackets, faded numbers, and a pair of rails disappearing into darkness.

Moe sat up. “Do you know where we are?”

Serj looked down the tunnel and smiled. “Of course.”

Nobody believed him.

Serj started walking anyway.

The others followed.

CHAPTER FIFTY-THREE THE JOKE IS REVEALED AND ITS ON ALL OF US

They walked for another two hours before anyone admitted the tunnel was getting worse.

The air grew colder. Serj insisted they keep their visors up. The need to conserve oxygen trumped comfort.

The cold air had none of the damp, living smell of the caves. Each breath tasted flatter than the one before it. Ricia checked the little atmosphere display inside her helmet, frowned and told everyone to stop wasting oxygen by complaining.

They complained more quietly.

Bo noticed the real problem before any of them.

There was nothing to taste.

No purple ferns hung from the walls. No glowing bacterial mats coated the water. No mushrooms sprouted from cracks in the concrete. There were no Mooninites tending hidden gardens, no baskets of roots to trade for buttons and no harmless gnats for Arles to lie about eating.

Bo ran one glove along the tunnel wall and inspected the gray dust on his fingertips.

He decided not to lick it.

That was how bad things had become.

Moe shook his nearly empty food sack. Something stale rattled at the bottom.

“We had better be getting close to Camp Rag,” he said. “I don't have much for dinner except three twigs and some moldy old fungus old.”

“We are close,” Serj said.

“How close?”

“Closer than before.”

Moe nodded. “Good. I'll boil that answer and serve it with the twigs.”

The rails continued through dry dust at the bottom of the tunnel. Rusty cables ran along the curved walls, held up by metal brackets. Every hundred meters they passed a sealed alcove or a faded emergency

cabinet that contained nothing but brittle paper instructions and parts from equipment nobody recognized.

Serj swept his shoulder light ahead. “These tunnels connected the bases years ago. Before they decided hoppers were cheaper to operate.”

“Cheaper than what?” Bo asked.

Serj did not answer.

A dark shape appeared at the edge of their lights.

At first it looked like another cave-in. As they approached, straight lines emerged from the darkness: a broad metal front, rows of windows, and a curved roof that nearly matched the tunnel ceiling. It resembled a giant crawler without tracks.

Four pairs of metal wheels rested on the rails beneath it. A second set of rails ran beside the first, leaving just enough space for another vehicle to pass.

The five of them stopped.

Bo tilted his head. “Where are its feet?”

“It has wheels,” Ricia said.

“Crawlers aren't supposed to have wheels. That's why they're called crawlers.”

Moe walked around the front and shone his light along the side. The vehicle consisted of several long cars joined together, the farthest one disappearing into the darkness. Doors stood at regular intervals. Above the windows, faded letters identified a destination that no longer existed.

Serj examined it with suspicion. Ricia examined it as if it might require medical treatment. Bo wondered whether it had a dining room.

Arles snorted. “Come on. Nobody here has ever seen a train before?”

They all looked at him.

“A what?” Bo asked.

“A train. Cars on rails. A machine pulls them through a tunnel.” Arles pointed at the rails beneath their boots. “This is a subway.”

Bo looked up. “But we're underground.”

“That's where subways go.”

“Then why isn't it called an undergroundway?”

Arles opened his mouth, considered the question, and decided to inspect the train instead.

He found an exterior service panel and pulled it open. Dust drifted out. Behind it waited a nest of pipes, cables and mechanical controls with labels worn smooth by a century of neglect.

Arles laughed with genuine delight.

Serj shook his head. “Come on. We don't have time for this.”

“We don't have time to not stop for this.” Arles pushed his arms into the machinery up to the elbows. “We can walk for two more days, eat Moe's sticks and suffocate. Or I start this up and we ride in style the rest of the way to Camp Rag.”

“That thing is ancient.”

“A little over a hundred years. Practically new by Saturnian standards.”

Arles wiped frost from a round radiation warning symbol. “Reactor looks good. Nobody stole the core. That's thoughtful.”

Ricia stepped back. “You can tell all that from the outside?”

“No.” Arles forced the service panel wider. “But it sounds reassuring when I say it.”

He crawled beneath the train.

The others stood in the cold while metal rang, wires snapped, and Arles occasionally asked for tools they did not have. When nobody supplied them, he used different tools they also did not have. Somehow he produced each one from inside his coat.

Moe leaned against the wall beside Serj.

“You really believe Camp Rag is still Jupiterian?” he asked.

“Utnam was there days ago.”

“Utnam also thought hiding wanted smugglers under his house was a retirement hobby.”

“Camp Ragnarok was never taken.”

“Every briefing for the last ten years says it was.”

“Every briefing also says we're fighting Saturnians. How many Saturnian uniforms did you see in that village?”

Moe looked away. “That doesn't prove anything.”

“It proves uniforms are expensive.”

Under the train, Arles began laughing.

It was not his usual delighted cackle after surviving something lethal. This laughter was slower. Older. It rolled out from beneath the machine and echoed along the empty subway tunnel.

Serj crouched. “What's so funny, old man?”

Arles slid out holding a burned cable in one hand.

“Kids,” he said. “You are all children.”

He sat up and pointed the cable at Serj. “You're what, nineteen?”

“Twenty.”

“Practically ancient. Young people never learn from their elders' mistakes. You wait until we're dead, forget what happened and make the same mistakes all over again. Then you give the mistakes new names so you can pretend they're yours.”

He stood and climbed through an open door into the lead car. The others followed him as far as the entrance.

Inside, the darkness smelled of dust, cold metal and very old insulation. Arles opened a cabinet behind the operator's station and began moving corroded switches.

“I'm sixty-five,” he said. “I remember when Camp Rag was attacked.”

Moe stepped inside. “Ten years ago?”

“Forty. Saturn sent a raiding force. They hit the outer defenses, lost half their people then ran away. Never overtook anything.”

Serj's voice hardened. “How do you know?”

Arles twisted two bare wires together.

A deep vibration passed through the floor. Somewhere beneath them, a pump began to turn. The sound stumbled, stopped, then returned with a steady mechanical throb. Dust shook from the ceiling. One by one, squares of ancient LED light flickered awake along the car.

Arles grinned in their pale blue glow.

“Isn't it obvious? I'm from Saturn.”

The train came alive around him. Displays filled with colored lines. Control panels unfolded from the walls. A thin band of light ran along

the ceiling and illuminated seats molded into shapes that looked far too comfortable for military use. Symbols crawled across the front window, testing systems that had not been awake since before Serj was born.

Bo climbed aboard first.

The equipment looked impossibly advanced. Nothing had been repaired with duct tape. No warning labels had been written in crayon. Even after a century underground, the controls were cleaner and more sophisticated than anything aboard the Arley Mith.

Ricia touched a glass panel. It lit beneath her fingers and politely asked her not to.

Moe stared at Arles.

Serj drew his pistol and leveled it at the old man's chest.

Arles raised both hands. “Hey. Take it easy. I defected forty years ago. I've been loyal to Jupiter longer than all of you put together.”

“You lied to us.”

“Nobody asked where I was born.”

“You told me you were from Ganymede.”

“That's where I lived after Saturn. It was a very complete answer to a different question.”

Moe rubbed both hands over his face. “I hate to say this, but if he wanted to kill us, he could have done it a long time ago.”

“Many times,” Ricia said.

“As much as I dislike him, I have to reluctantly agree.” Moe pointed at the reactor cabinet. “Also, at this exact moment, he may be the only person who knows how to stop that from exploding.”

Arles glanced at the cabinet. “May be.”

Serj held the pistol on him several seconds longer. Then he sighed and put it away. “Get the train moving.”

Arles bowed. “Yes, Sergeant.”

The doors groaned shut. Arles worked the controls, and the train rolled forward with a shriek of metal wheels. The sound softened as it gained speed. Darkness divided around the front window while ceiling lights appeared one after another and vanished behind them.

For the first time in days, they could relax. Moe inventoried the train's emergency galley and discovered that its food had expired ninety-three years earlier. He announced that this made it fresher than the fungus. Ricia found a seat and examined Arles from across the car. Serj stood beside the operator's station, one hand never far from his pistol.

Bo sat in the front row and watched the second set of rails race beside them.

Arles drove one-handed. With the other, he adjusted an old communications panel.

“You want to hear something funny?” he asked.

Nobody answered.

He told them anyway. “About ten years ago, somebody back on Jupiter decided to change all the radio frequencies used on Callisto. Brilliant security plan. The Saturnians couldn't listen if nobody used the frequencies they knew.”

“That part is true,” Moe said.

“Of course it is. The funny part is that, through some clerical error, nobody bothered to inform Camp Ragnarok. One day every transmission from the outside stopped. Camp Rag called the carrier, the other bases, the supply network, everybody. Nothing.”

Arles steered the train through a gentle curve. Blue emergency lights flashed past the windows.

“They assumed the worst. Callisto had been overrun. Saturn had captured all the other bases. Camp Rag was alone and under siege. So they sealed themselves in, armed the defenses and waited for the attack.”

Moe straightened. “Hold on. You have that backward. When the frequencies changed, we on the outside thought Camp Rag had been overrun by Saturnians.”

Arles smiled. “Of course.”

Moe raised one eyebrow. The color slowly drained from his face. “But that would mean…”

Arles slapped the control panel and laughed. “Now you get the joke.”

Serj was not laughing. “What joke?”

Arles turned in the operator's chair. “There are no Saturnians on Callisto. Except for little old me, maybe. Haven't been any since Jupiter

blew up Titan and they all ran home crying to mommy."

The wheels hammered across a joint in the rails.

No one spoke.

Bo struggled to arrange the facts inside his injured head. Camp Rag thought Saturn had taken Callisto. The rest of Callisto thought Saturn had taken Camp Rag. Both sides had spent ten years waiting for the other side to attack.

There had been attacks. Bo had seen thousands of soldiers die. He had watched Vacuum Corps troops shoot other Vacuum Corps troops in the store. He had seen the third lieutenant cut apart by reinforcements after identifying himself. He remembered the soldier climbing out of Ary's reactor, refusing to meet her eyes and disappearing behind crates.

"So if there aren't any Saturnians left," Bo said, "who are we fighting?"

Arles's laughter returned, louder than before.

"Yourselves. This whole time." He pointed at them, then at the tunnel racing past outside. "You're the jokers. Get it? It's all one big joke, and you're your own punch line."

Serj hit him.

The punch knocked Arles out of the operator's chair and sent him sprawling across the floor. The train continued forward under automatic control.

Arles tried to rise. Serj kicked him in the ribs, dragged him up by the front of his suit and punched him again.

The old man's head struck the edge of a seat. Blood ran from his nose and froze in a thin line across his cheek.

He laughed once more, but there was no strength in it.

Serj drove him to the floor and kept hitting him.

Bo stood perfectly still.

He had never seen Serj lose control. Serj cheated, lied, stole, threatened and occasionally ordered people into dangerous streams, but he did all of it calmly. Now he was on top of Arles, striking him with both fists and breathing like his suit had run out of air.

Arles raised one arm too slowly to protect himself. Serj knocked it aside.

"Ask him," Arles whispered.

Serj paused.

Arles looked past him at Bo. One eye had already swollen shut. “Has he told Bo yet?”

Bo heard that. “Told me what?”

Serj punched Arles again. “I've heard enough of your lies, old pinko bastard.” He hit him until Arles stopped moving.

Moe grabbed Serj beneath one arm. Ricia took the other. Together they dragged him backward while he kicked at the unconscious man.

“He's out!” Ricia shouted. “You'll kill him!”

“Maybe he deserves it.”

“Then wait until I decide whether his reactor repair deserves it too.”

They forced Serj into a seat.

Bo remained in the aisle with his arms crossed. He scowled at Serj.

Serj wiped Arles's blood from his knuckles and refused to look at him.

Something was fishy.

A strange beeping came from the main control panel. At first it blended with the hum of the train. Then it repeated: three high notes, a pause and three more.

Moe ran to the operator's station.

“What is it?” Serj asked.

Moe pulled open a panel beneath the communications controls. A red light pulsed inside. He followed a cable to a metal box bolted behind the display. “A transponder.”

He tore it loose and smashed it against the edge of the console.

The beeping stopped.

Moe stared at the broken transmitter in his hands.“Crap.”

Serj stood. “How long has that thing been transmitting?”

“Long enough.” Moe dropped it. “It's only a matter of time now.”

Bo looked out at the concrete wall flashing past. “But we're too deep for radio signals to get out, right?”

Moe shook his head. “Why would they put a transponder in a place

where it couldn't work?”

Serj answered with a question of his own. “Why would they do anything? Jupiter has gone insane.”

Bo snorted. “We're all insane.”

Nobody laughed.

CHAPTER FIFTY-FOUR TWENTY CLICKS DOWN THE TUNNEL

The first earthquake struck while the train was moving at full speed.

The rails jumped beneath them. Every light in the car went out, came back red, then returned to blue in protest.

Bo flew out of his seat and landed across Arles, who was still unconscious on the floor. Ricia caught herself against a pole. Serj smashed into the same pole, bounced off and ended up with his back against the opposite wall.

Moe caught nothing. He bounced off the operator's console, grabbed both controls and accidentally blasted the warning horn.

Concrete cracked overhead. A slab struck the roof with a boom that flattened everyone except Moe. Dust flooded through the ventilation system. Smaller pieces hammered the cars behind them while the tunnel rolled from side to side around the windows.

Another quake arrived before the first one finished. The rails twisted. The train lurched left, right, then briefly tried to climb the tunnel wall. Metal wheels shrieked against metal track while sparks streamed beside the windows.

Moe shoved the throttle all the way forward. Somehow the train found the track again and accelerated. “How far to Camp Rag?”

Serj dragged himself upright. “Twenty clicks. We'll be there in thirty minutes.”

A section of ceiling collapsed behind them and swallowed the last car in dust.

Serj gripped the back of Moe's seat. “We are this close.”

Moe stared through the front window as broken concrete skipped across the rails ahead. “If we don't derail first.”

“Then don’t screw up.”

The train hit the debris. Everyone left the floor together. For one peaceful instant they floated in the car. Then gravity put them back wherever it felt like.

Bo landed in the operator's compartment beside Moe. Ricia landed in a seat backward. Serj struck the ceiling. Arles remained on the floor, which

had been the safest place all along.

The wheels found the rails again and the train somehow kept going.

A low grinding vibration traveled through the concrete. It was deeper than the earthquakes and too regular to be natural. It grew louder with every second.

Moe wiped dust from the front window. “If anyone wants to pray to Elvis, now’s the time.”

The tunnel wall exploded. A giant drill burst down through the ceiling two hundred meters in front of them. It was shaped like a spiral top driven point-first into the subway tunnel. Huge screw-shaped grooves wrapped around its body. Circular cutter heads spun between them, chewing concrete and ice into a boiling cloud. Agitators whipped the debris aside while the entire machine descended from a fresh vertical bore.

It seemed to float in mid one for one split second, then it smashed through the rails. Its point buried itself in the floor followed by the broad upper body crashing sideways and blocking both tracks from wall to wall.

The cutters slowed but the train kept coming. The drill stopped spinning and released a terrible metallic moan.

Moe pulled one control. Nothing happened. He pulled another. The ceiling lights became brighter.

Serj bared his teeth. “Brakes, man!” he grunted.

“I’m trying, damn it!”

“Try faster.”

The train continued barreling forward and let out its own shriek at the rapidly approaching drill as if answering its call.

Bo jumped beside Moe and began pushing buttons randomly.

“Stop helping!” Moe shouted, as he himself kept trying to find the braking mechanism.

Bo pushed a large yellow button beneath a cracked cover. Instantly panels burst open throughout the car. Emergency airbags inflated from the walls, ceiling, seats, floor and several locations nobody had known contained panels. One swallowed Ricia. Another pinned Serj upright with his arms spread. Moe disappeared inside a white cushion shaped

like a fist.

Bo had time to say, “That’s not what I thought the button did,” before three airbags struck him from different directions.

Above the drill, the open bore shaft sucked the tunnel's air toward the surface. Dust, scraps of paper, and loose equipment streamed past the train. The atmosphere thinned fast enough to make their ears pop.

Then falling debris from far overhead collapsed into the shaft. Rock and ice packed the bore above the drill. The suction stopped. The remaining air rebounded through the tunnel in a wave.

At this point the train decided it was a good time to hit the drill at full speed. The lead car folded around the impact. Windows burst and seats tore loose. Metal screamed as the cars behind drove into one another. The airbags compressed until Bo could feel the shape of every bone in his body, then hurled him backward into a second set of airbags.

The train’s forward moment stopped instantly but it didn’t stop moving. The cars behind it piled up and kept on coming, crushing and smashing everything in their way. For a terrible thirty seconds metal screamed and concrete exploded as the cars fought against gravity and the giant drill. The drill and gravity won and the train cars finally crashed to a halt.

For a moment there was no sound except for the team wiggling around in the plastic trying to figure out what just happened.

Then the vacuum corps soldiers came down out of the bore hole. They poured through the narrow gap between the drill and the ragged passage it had cut from the surface. Half of them still wore jetpacks.

The first soldier entered too fast and struck the curved tunnel wall headfirst. The second bounced off the drill and shot down the eastbound tracks. A third spun in circles while firing his rifle. Two more collided in midair and vanished together into the darkness behind the wreck.

The troops without jetpacks were more successful. They jumped, crawled, and slid down the drill like ants. Boots hit concrete. Rifles came up. Red laser bolts stitched across the crushed front of the train.

Serj cut his way out of an airbag. “Back!” he shouted, “Everybody out the back!”

Moe kicked through a window with Ricia crawling after him. Bo pulled himself free and grabbed the rifle that had been trapped beside Arles.

The old man lay where the impact had thrown him, blood drying

beneath his nose. His chest rose once beneath the torn front of his suit.

Bo reached for him but before he got six inches Serj grabbed Bo by the collar and hauled him toward the rear. “Leave him!”

“But he's still alive!”

“Not for long. Move!”

They climbed through the wreckage of three crushed cars while laser fire followed them. Soldiers swarmed over the roof and through shattered windows. Someone landed on the side of the train with a jetpack still burning and peeled away half the outer wall.

Finally clear of the wreckage Serj spotted a concrete ledge a foot to the left of the train and ordered everyone up on it. A few paces down the ledge Moe found a maintenance door in the tunnel wall. Its faded lettering read SERVICE PERSONNEL ONLY.

He kicked the door in revealing a round passage barely two and a half meters wide, then turned to cover the others with bright flashes from his rifle.

Serj shoved Ricia through, then Moe, then Bo. He fired a burst into the train and backed inside after them. Arles did not join them.

The service tunnel was packed with dead machinery. Dusty pumps, electrical cabinets and broken pressure regulators crowded both walls. Old pipes crossed the passage at knee, chest and head height as though their designers had measured three different species.

Laser bolts snapped through the doorway behind them.

The four of them dived behind the equipment. Moe took cover behind a pump. Ricia wedged herself between two cabinets and fired one-handed. Serj crouched behind a pressure tank and fed a slip into his service pistol.

Bo dropped behind a dead compressor and aimed at a soldier rounding the corner behind them. He fired once. The beam struck the center of the soldier's shoulder. He fell backward into the soldier behind him. Bo shifted his aim and fired again before the second man could recover.

Two shots. Two bodies. Bo stared at his rifle. It had never behaved that way before.

More soldiers pushed around the corner. Bo fired in controlled bursts. His hands found the recoil, his eyes found the targets and the hole in his head did not interfere with either. He hit shoulders, visors, chest plates

and exposed suit seams.

Moe glanced at him in surprise. “When the hell did you learn to shoot?”

“Just now!”

The others joined him in defending the passage way. Red laser flashes cut back and forth in both directions.

The first bodies fell across the narrow passage. The next soldiers climbed over them and added themselves to the pile. Rifles protruded between legs and armor plates. Laser beams cut pipes overhead, filling the tunnel with steam and frozen droplets. Still more soldiers came.

Bo changed magazines without looking. He shot a helmet light, then the face behind it. Ricia put three rounds through the same gap. Moe fired until his rifle overheated and used it to strike a man reaching across the bodies.

At some point the pile reached the ceiling. It sagged forward and sealed the passage with armor, limbs, rifles and leaking suit foam.

Serj stood. “MOVE! MOVE!”

They ran. The service tunnel twisted beside the subway. Their shoulder lights jumped across cracked concrete and abandoned valves. Bo heard soldiers digging through the bodies behind them. Then rifles opened fire again, sending laser bolts down the passage at their backs.

They ducked beneath pipes and leaped over equipment. Ricia's artificial leg struck the concrete with a hard, uneven rhythm, but she kept up. The floor vanished ahead.

Moe stopped so abruptly Serj ran into him. “Whoa!”

A vertical shaft had torn through the service tunnel. It was several meters across and extended beyond the reach of their lights. Broken pipe ends hung over the void. Far below, pieces of concrete struck unseen surfaces one after another, each sound fainter than the last.

The service tunnel continued on the other side, teasing them with its promise of safe passage.

Moe jumped first. He landed hard, rolled then waved Serj across. Serj cleared the gap with room to spare. Bo took three running steps and sailed over after him.

Ricia stopped at the edge. She looked down at her artificial leg. Then she looked across at them.

Bo saw her and turned back. He held out his hand. “Jump!” he cried.

Ricia shook her head. Laser fire flashed around the bend behind her.

“Come on!” Bo insisted, “I'll catch you!”

She backed away from the edge but could not put enough weight through the artificial foot to run. The mechanism slipped on the dusty floor.

Bo took two steps back from his side. “You wait there. I'm coming to you.”

Ricia raised both hands. “Bo, no! Stop!”

Bo ran.

The ceiling above Ricia exploded and a second drill came through point-first. It appeared and disappeared in the span of one second: spinning cutter heads, a screaming spiral of steel and a wall of pulverized concrete. It passed through the service tunnel, through the floor and continued down into the darkness.

The shock wave knocked Bo backward before he reached the edge.

Dust erased everything. Broken pipes whipped in the air. Concrete struck his armor. The entire tunnel flexed and groaned around the new hole. At least there wasn't a vacuum behind the drill to suck the stale air out.

When the dust cleared, Bo stood up and inched towards the edge. The gap was twice as wide now and there was no one on the other side. “Ricia?”

Only dust drifted through the beam of Bo's shoulder light.

“RICIA!”

Red laser bolts answered him. The advancing soldiers appeared through the haze on the far side, climbing over broken concrete with rifles raised.

Bo screamed. He dropped to one knee and fired across the gap. His first beam struck a soldier in the throat ring. The second punched through a visor. The third hit the wall, but the next four did not.

The soldiers scattered and shot back.

Bo kept firing. His rifle overheated but he pulled the trigger anyway. Warning lights filled his visor. He screamed Ricia's name and tried to cross a gap no person could jump.

Serj came back for him. He hooked both arms beneath Bo's shoulders and dragged him away from the edge.

“Let me go!”

“It’s too late!”

“LET ME GO!”

Serj turned Bo around and shoved him down the tunnel.

Moe fired past them while retreating. Bo stumbled, recovered and fired over his shoulder. The soldiers advanced through the dust on the other side of the widening abyss and used their jet packs to cross it.

The three survivors ran toward Camp Rag. Behind them, the crazed soldiers and the wayward drills kept coming.

CHAPTER FIFTY-FIVE FOR GRANNY - CHASED DOWN THE TUNNEL

The service corridor twisted often enough to keep them alive. Every few meters it bent around buried machinery, rose over a bundle of pipes, or dropped beneath a concrete support. The soldiers behind them fired whenever the passage straightened, but each burst struck a wall after only a few meters. Red flashes chased Bo, Moe and Serj from corner to corner without ever finding a clear line of sight.

Eventually the firing grew distant and the three of them slowed. Moe leaned against the wall where he bent over and tried to breathe quietly. Serj kept one hand pressed against his side where a laser had pierced his armor and used the other to steady himself. Bo's lungs hurt. His rifle shook in his hands, though he could not tell whether that was exhaustion or something else.

No one mentioned Ricia.

They could still hear the drills grinding through Callisto above them. Each impact sent dust curling from the ceiling and made the pipes tremble in their brackets.

They continued on until the corridor widened into a junction. Four service tunnels met in a round concrete chamber. One continued level and curved left. A second climbed at a steep angle beneath a row of broken lights. A third sloped downward into darkness. The fourth entered behind them from above, joining their own route at an awkward angle.

Faded arrows covered the walls, but the words beside them had worn away. Every arrow appeared equally confident.

Moe looked back and forth between the choices. “Which way?”

Serj pointed to the climbing tunnel. “This way. Come on.”

A voice spoke behind them. “That way doubles back and leads you straight to hell.”

They spun with their rifles raised.

Arles limped into the junction from the fourth tunnel. He used a rifle as a crutch. Half his combat suit had been torn away. One shoulder was bare except for a strip of burned underlayer, and blood covered the remaining armor from his collar to his waist. His face was swollen,

bruised and split in several places. More teeth were missing than when they had left him. Somehow he had manged to keep both bandoliers full of grenades. He looked delighted to be there.

Bo stared. “You're alive.”

“So I noticed.” Arles leaned against the rifle and spat some blood onto the floor. “Not sure how long it'll keep.”

Moe pointed at the tunnel behind him. “How did you get out of the train?”

“Same way everyone gets out of anything. I waited until the people trying to kill me argued about whose fault it was, then crawled away.”

Serj's jaw tightened.

Arles nodded toward the climbing passage. “That one loops around the subway and returns to the wreck. If hell has a front entrance, that's it.”

Moe straightened. “You're not the leader of this squad.”

“Neither are you.”

Bo looked from Arles to Serj.

Arles had lied about being Saturnian for as long as Bo had known him. Serj had lied about knowing the way, knowing Camp Rag, knowing what the artifact was and possibly something about Bo himself. One had just been beaten unconscious. The other had done the beating.

Bo did not trust either of them. He turned toward the downward-sloping tunnel. “I'm going the third direction.” He shouldered past Serj and walked into it without looking back.

Serj watched him go. He then smiled and pointed the way Bo had gone. “Good-luck charm," he said, and followed.

Moe looked at Arles.

Arles looked at Moe.

Behind them, soldiers shouted in the tunnels. “OOO RAH!” The shout echoed through all four passages at once. It multiplied until an entire invisible army seemed to surround the junction.

Moe sighed. “Hell, I’ve got nothing to lose.” He followed Serj.

Arles adjusted the rifle beneath his arm and limped after them.

The downward tunnel soon leveled out. It was narrower than the one

they had left with old pipes crowding its ceiling. Their shoulder lights flashed across valves, cable boxes and layers of dust that had not been disturbed in a century.

The voices behind them grew louder. “OOO RAH!”

A different shout answered from ahead. “FOR GRANNY!”

Bo stopped. The others silently waited behind him.

More voices joined the shout ahead. Boots struck the concrete in rhythm. Rifle bolts clicked into firing chambers. “FOR GRANNY!”

Serj turned toward the rear.

The other force was closing just as fast. “OOO RAH!”

They were caught between two advancing units.

Moe ran his hands along the walls, searching for a hatch. He found welded access plates, dead electrical boxes and one cabinet containing a fire hose that had dissolved into powder. There was no side passage. No ladder. No air duct large enough for man to fit. No escape.

Arles lowered himself against a pipe and tried to catch his breath. “Funny,” he said. “Both sides sound very patriotic.”

Serj ignored him.

Bo ejected the empty magazine from his rifle. It struck the floor and spun in the dust. He pulled a fresh magazine from his belt, slapped it into place and chambered the first laser round.

The troops ahead rounded a distant bend. Their helmet lights swept across the walls. “FOR GRANNY!”

Bo tightened his grip. “I'll show them what For Granny really means,” he grunted, then started running.

The first soldier appeared around the corner. Bo fired before the man finished raising his rifle. The beam struck his chest plate and threw him backward into the formation behind him.

Bo kept running and shooting.

The tunnel filled with red light. His rifle pulsed against his shoulder as fast as he could pull the trigger. Soldiers fired back. Bolts scorched the walls beside his head and cut glowing lines through the pipes overhead.

Bo did not slow down.

Behind him, the other three stopped. They looked at one another without speaking. All three were out of breath. Moe's rifle was overheating again. Serj's armor was falling off and there was a crack in his helmet. Arles could barely stand without his rifle crutch.

The Ooo Rahs thundered closer from the rear.

Arles smiled. His swollen lips parted, revealing empty sockets and bloody gums where several teeth had recently been. He let the rifle fall. Grenade bandoliers still crossed the surviving half of his combat suit. Some grenades had been damaged in the train crash, others were scorched but none looked safe.

Moe looked at him. “What are you doing?”

Arles began pulling pins. One. Two. Three. He hooked his thumb through the rings and stripped them away in handfuls. The pins scattered across the floor with tiny metallic notes.

Moe watched him. “You're doing that thing again.”

“This time I mean to.”

Arles pulled the last pin from the grenades on his chest.

Moe shook his head. “Screw that, man. I'm with Bo.” He turned and ran toward the gunfire ahead.

Arles looked at Serj.

Serj still snarled at him. His fists tightened as if he had enough hatred left to finish what he had started on the train.

The first soldiers appeared around the rear bend behind them.

Arles leaned back against the wall. Smoke curled from one damaged grenade casing. “What are you waiting for, Sarge?” he asked. “Go. I'll buy you a few seconds.”

Serj's expression changed. For an instant the anger disappeared. Something else took its place, but there was not enough time for it to become recognizable.

Arles grinned through the blood. “Don't let these be a waste.”

Serj screamed something incoherent at him. It might have been an insult. It might have been a question. It might have been the old man's name. Then Serj turned and ran.

Ahead, Bo drove into the advancing soldiers. He shot one, struck

another with the rifle stock and ducked beneath a beam that passed close enough to heat the side of his helmet. Moe reached him and opened fire over his shoulder.

Behind them, Arles waited alone in the center of the tunnel.

The soldiers charged him shouting, “Ooo Rah!”

He raised both hands full of grenade pins. “Wrong answer, kids.”

The grenades detonated and the service tunnel became white light. A wall of pressure raced forward, carrying dust, pipe fragments, concrete, armor plates and the remaining stale air.

It caught Serj squarely in the back and lifted him off his feet. He flew down the corridor and struck Moe from behind. Moe struck Bo and all three crashed into the soldiers ahead in one tumbling mass of bodies and weapons.

When the tunnel collapsed behind them, the Ooo Rahs finally stopped.

CHAPTER FIFTY-SIX THE REST OF SERJ

Moe never learned what removed Serj's helmet.

It might have been the grenade blast. It might have been weapons fire from the soldiers ahead. It might have been a piece of pipe traveling faster than any piece of pipe had a right to travel. After everything that had happened on Callisto, Moe was willing to leave room for something more mysterious.

Whatever did it made a clean cut. Serj's helmet separated from the rest of his combat suit. His head decided it was prudent to go with the helmet instead of remaining behind with the body.

Together, head and helmet sailed through the dust.

Moe had been knocked flat by the blast. He rolled onto his back and raised his arms to sit up just as the helmet landed in his lap.

He stared down through the visor.

Serj stared nowhere. His eyelids fluttered. The emergency collar inside the helmet had expanded around the severed neck and sealed it properly. Red lights blinked along the lower rim. A calm recorded voice announced that an unauthorized separation had occurred and would be reported to a superior officer, if and when one could be found.

Bo lay flat on the floor in front of Moe, feeling beneath bodies and broken pipes for his rifle oblivious to what Moe was doing.

Moe checked the seals around the helmet ring. Nothing leaked. The suit engineers had apparently expected this exact problem often enough to provide instructions on the back.

Moe reached into his pocket and pulled out a nutriment pack. It was the last one he had not tried to cook. He tore off the protective cap and attached the pack to a special port behind the helmet. The port drew the tube inward with a click. Yellow fluid began feeding through a clear line toward Serj's neck.

Bo stopped searching then rolled over to see what Moe was up to. Very slowly he said, “No.”

Moe ignored him and kept at it.

Bo took a deep breath. “Why'd you go and do that?”

Moe tightened the connection. “Because he's alive.”

“Barely.”

Moe grunted and continued what he was doing.

Bo pushed a dead soldier off his legs and sat up. “Serj tricked us. He used us. He doesn't give a crap about anybody but himself. I say leave him behind.”

Moe shook his head. “I ain't giving up.”

“I'm not either. That's why I want to leave him.”

Moe checked Serj's pupils through the visor. They did not react. The head appeared to be in a coma, which was probably the kindest place available to it.

Bo searched the floor again. His rifle was gone. It might have been buried beneath the bodies. It might have been blown into the new cave-in. It might now belong to the rest of Serj. Instead, Bo found a length of rebar torn from the tunnel wall by the explosion. It was almost two meters long, jagged at one end and still warm. He lifted it in both hands and aimed the point down the corridor like a pike.

Moe looked at him. “What are you doing?”

“Finding someone to skewer.”

Moe strapped Serj's helmet to the back of his suit. The visor faced outward over his shoulder. With each movement, Serj's head rolled gently inside it. “I got an idea,” Moe said. “Come on.” He ran back toward the explosion.

Bo did not care which direction Moe chose, provided somebody in it could be skewered. He followed with the rebar lowered.

The remains of Arles's last stand filled the service tunnel. Dust and pulverized concrete still floated in the weak gravity, turning their shoulder lights into solid white beams. A section of ceiling had dropped across the corridor. Bent pipes protruded from it like broken ribs. Pieces of combat armor lay everywhere, none large enough to identify with confidence.

Moe moved slowly through the wreckage.

Not far beyond the collapse, soldiers asked confused questions in the dark.

“Which way is up?”

“Why is the floor on the wall?”

“Who turned off my left leg?”

Moe looked at Bo and raised one finger to his lips.

Bo nodded and tightened his hands around the rebar.

Moe pointed to the wall immediately beside the blast site.

The explosion had punched through the concrete lining and excavated a small cave in the rock-hard ice behind it. The opening was half hidden by a fallen pressure tank. Beyond it waited a shallow alcove large enough for two living soldiers and one detached commanding officer.

Moe slipped inside and motioned for Bo to follow.

Bo looked toward the voices. His newly discovered lust for blood urged him down the tunnel. His much older sense of self-preservation urged him into the hole. Self-preservation won by half a vote. Bo crawled into the alcove with his rebar pike.

They lay behind the pressure tank and caught their breath. Meltwater dripped from the gouged ice onto Moe's armor. Serj's helmet rested against the wall, still strapped to his back. The nutriment line pulsed once every few seconds.

Serj's eyelids continued fluttering.

“You think he's dreaming?” Bo whispered.

“I hope not.”

The dust began to clear and shapes appeared beyond the explosion site. Helmet lights cut through the thinning cloud. Soldiers picked their way over broken equipment and the remains of their own unit.

One saw the open corridor ahead. “CONTACT!”

The whole group began shouting and firing.

They ran past the hidden alcove without looking inside. Boots scraped the pressure tank inches from Bo's face. Rifles swept over the opening. One soldier paused directly in front of them to reload, then followed the others into the smoke.

The opposing force answered from farther up the tunnel. “FOR GRANNY!”

“OOO RAH!”

Laser fire filled the passage. Each side saw Vacuum Corps armor advancing out of the dust and reached the same conclusion. The other

side was the enemy. For twenty minutes, soldiers ran past the alcove and disappeared into the maelstrom. Red light strobed through the opening. Men shouted unit numbers, passwords, accusations and patriotic slogans. Nobody waited long enough to hear anyone else's answer. Bodies accumulated in both directions.

A soldier crawled past using only his elbows. Another chased a helmet that contained no head. A third stopped to ask the two of them whether it had seen any Saturnians around.

Bo and Moe both shook their head no.

The soldier sighed and ran back into the battle firing away.

Bo set his rebar back down.

Moe kept one hand on the helmet strapped to his back. Serj slept through everything.

The battle gradually consumed itself. The firing became intermittent, then solitary. One final rifle discharged three times. Someone shouted Ooo Rah with less confidence on each syllable. Finally silence returned.

Moe waited another full minute before lifting his head above the pressure tank.

Bo watched him.

Moe looked toward the battlefield, then back toward the junction. “Clear.”

They crawled out.

Up the tunnel, the passage was blocked by dead soldiers. The two forces had packed themselves together until armor, rifles, and bodies formed a barricade from wall to wall. Smoke leaked through the remaining gaps.

Behind them, the route back to the four-way junction remained open.

Moe adjusted Serj's helmet on his back. Bo rested the rebar across his shoulder.

They headed back without speaking. Their boots made almost no sound in the dust. They crossed a makeshift bridge the soldiers had erected to cross the gap, then continued on down the corridor back the way they had come.

After several turns, Bo heard something behind them. A scrape. Then a heavy step. He stopped and looked back.

The corridor was empty beyond the reach of his shoulder lights. There were no Ooo Rahs or For Grannys anywhere to be heard.

“I think a bear is following us,” he whispered.

Moe stopped and shushed him. He listened, then after hearing nothing continued walking faster.

They reached the junction. Four tunnels waited exactly as before. This time there was no argument. Bo pointed at the climbing passage Serj had originally chosen. He looked at Moe. “You still want to complete the mission or rejoin the Vacuum Corps and shoot each other?”

Moe did not hesitate. “For Ricia.”

Bo nodded. “For Rbra and Ary.”

The names hung in the chamber for a moment. Then Moe and Bo ran up the correct tunnel toward Camp Rag.

Behind them, something entered the junction. It wore what remained of Serj's combat suit. The torn neck ring was sealed with a cap of emergency foam. Both arms hung at its sides. One hand remained pressed against the side that had taken weapon’s fire.

The headless body paused. It turned toward the climbing tunnel and stumbled into it.

CHAPTER FIFTY-SEVEN ONLY VIBRATING THINGS - VISIT FROM AN OLD FRIEND

Several clicks up the climbing tunnel, Bo and Moe stopped to breathe.

The passage had narrowed around them until their shoulders nearly brushed both walls. It continued upward at a mean angle, bending just enough that they could never see more than twenty meters ahead. Old utility brackets protruded from the concrete. Every few minutes the floor shuddered from something drilling far away and frost sifted down from the seams.

Moe sat against one wall. Bo sat against the other. Between them, Serj's helmet rested on the floor with its visor turned toward the ceiling.

The nutriment line still pulsed into the back of it.

Bo remembered some food pouches he'd stached in his boots and tossed one to Moe. Moe could make it no readable label but ate anyway. He sucked down a mouthful then looked up the tunnel. “We have to be getting close by now.”

Neither of them mentioned Ricia. Or Arles. Or Rbra. Or Ary. Or anyone else who had stopped being part of the mission along the way.

Bo chewed a piece of fungus that was living in his pouch. “I don't care about clicks anymore,” he said. “Or feet. Or none of that crap. I want my cut of the deal. Then I'm gonna use it to make whoever's responsible for all this killing pay.”

Moe studied him. “That make you feel better?”

“Hell yeah.”

“You ever got revenge before?”

“No.”

“Then you don't know what you're talking about.”

Bo snorted a little laugh despite himself. It surprised him enough that he stopped eating.

Moe pointed at him with the empty food pouch. “Let me see the artifact.”

Bo's smile vanished. “Oh, crap. It's still in Serj's pocket.” He looked back down the tunnel dreading the consequences of the thought before he had even finished having it.

Moe shook his head. “No. Serj told me there was nothing in his pocket. Said that was just a distraction to keep Arles from sniffing around.”

“Then where is it?”

“He said you had it.”

Bo stared at him. “No.”

“No what?”

“No, I don't got it. He didn't give me squat.”

Moe stood. The top of his helmet scraped the low ceiling. “He must've hidden it in your suit. Get up. Let me check you.”

Bo grunted, but pushed himself to his feet.

A scraping sound came from below.

Bo spun and leveled the rebar down the passage. “I told you I heard a bear.”

Moe switched his shoulder lamps to their narrow setting. Two white beams stabbed into the dark.

Something moved at the far edge of them. A boot dragged over concrete. An armored knee locked, released and locked again. One hand brushed the wall as if counting the vibrations inside it.

Serj's headless body stumbled into the light. The emergency foam over its neck ring had gone gray with dust. Its combat suit was splattered with frozen blood. One sleeve was scorched away to the elbow. The hand that had been pressed against its chest now opened and closed at its side.

Moe stared. “What the hell?”

Bo looked at the helmet on the floor. “Guess it wants its head back.”

Moe tried to think of an explanation. Serj had special training. Everyone knew that. There were breathing drills and pain drills and exercises designed to make the body obey after the brain had decided it was finished. This seemed excessive.

The body shuffled closer. When it came within reach, Moe planted a boot against its chest and pushed.

The body stumbled backward three steps. Its arms swung wide. One shoulder struck the wall. Then it recovered its balance and advanced again.

“Step back,” Moe said to Bo.

He and Bo flattened themselves against opposite sides of the tunnel. The body passed between them, following the slope upward. Its empty collar turned neither left nor right. It walked six paces and stopped. Slowly, the rest of Serj turned around then it began walking back towards them.

“Told you,” Bo said. “Give its head back already.”

Moe shook his head. “It's not the head. Can’t be. It can’t see or hear without a head. It must be sensing vibration. And we're the only things vibrating around here.”

Bo's grip tightened on the rebar. “I can make it stop vibrating.”

“Wait.”

Bo charged. He drove the jagged point toward the body's chest. Trained hands snapped up. One caught the rebar. The other caught Bo by the forearm. The body pivoted and threw both weapon and soldier into the wall.

Bo hit shoulder first, bounced, and tumbled across the floor. The rebar clanged away into the dark.

The body turned toward Moe.

Bo rolled onto his back and kicked the body behind the knees. Serj's legs folded. The body fell forward into Moe and wrapped both arms around him in a bear hug.

Moe punched it in the ribs. Then in the kidneys. Then several times in places that would have convinced a living man to reconsider his plans. Nothing loosened its grip. It leaned forward and drove Moe helmet-first into the tunnel floor.

The impact cracked concrete.

Bo scrambled over and seized the body's shoulders. He pulled. It felt like trying to uproot a hydraulic press. “Shoot it!” he shouted.

Pinned beneath it, Moe reached for his sidearm.

The body sensed the movement. One hand released Moe and closed around the pistol as it cleared the holster.

Moe held the grip. The body held the barrel. They fought over it in the narrow space between their helmets. The muzzle turned toward Moe's face and fired. White light filled Moe's visor for a brief instant.

Bo crawled off them and went back for his rebar. He came back running and drove the jagged end between two armor plates in the body's back and kept driving until it burst out through the front of Serj's suit.

The body arched.

Bo lifted with everything in him. The rebar became a lever. Serj's body rose off Moe, struck the wall, and flipped down the tunnel.

It landed on its hands and knees. It wobbled there a moment then tried to stand.

Bo tore the pistol from Moe's hand and stormed after it. He fired into Serj's back. Again and again.

Each laser bolt punched through armor and lit the tunnel beyond. The body crawled. Bo kept firing until the suit burned, the emergency foam melted out of the neck ring, and the arms finally collapsed beneath it.

One hand twitched against the concrete. Bo shot it too.

Silence rushed back into the tunnel.

Bo stood over what remained, breathing hard enough to fog the inside of his visor. “Should've let me skewer you sooner.” He waited for the body to disagree. It did not.

Bo gave the body one last kick before going back to Moe.

The big man lay where he had fallen. A hole had been drilled through the left side of his visor. It continued through his eye and out the back of the helmet, where the automatic seal had already closed around the wound.

Moe was still breathing. Sort of. His chest rose halfway, stopped, and fell. A few seconds later it tried again.

Bo knelt beside him. “Damn it, Moe. You're gonna make me carry you the rest of the way now?”

Moe did not answer.

Bo looked at him for a long moment then he pretended Moe had. “Okay. But you owe me one.” He holstered the pistol, slid the rebar through the straps on his back, and lifted Moe across his shoulders. Moe was heavier than he looked, which Bo had not believed possible.

Serj's helmet still hung from Moe's pack. The nutriment tube remained attached. As Bo stood, the helmet swung against his hip and Serj's eyelids fluttered behind the visor.

Bo had no idea the head was still tethered to Moe or he would have drop kicked it down the tunnel. He adjusted Moe's weight, turned uphill and started walking toward Camp Rag.

Behind him, the ruined body of the sergeant did not move again.

Ahead, something deep in the tunnel began to hum.

CHAPTER FIFTY-EIGHT CAMP RAGNAROK

Colonel Fodder was a Jupiterian in a soldier's body.

He loved Jupiter. He loved its storms, its floating cities, its crushing gravity, its eight-hundred-year-old bureaucracies and the way every government office had a different form for proving you owed it money. He loved the planet's red clouds, its white clouds and its clouds that dissolved unlicensed aircraft.

He loved everything about Jupiter except Jupiterians.

More specifically, he hated their bodies. Natural Jupiterians were built for their world: squat, broad and extremely difficult to tip over. Fodder's original body had been a little over a meter tall, nearly as wide and protected by folds designed to keep important organs from being compressed into less important organs. It had been respectable. It had been traditional. It had also been fat.

Now he stood two meters tall. His shoulders fit through ordinary doors. His knees pointed in useful directions. He could look down and see his boots without leaning forward or consulting a mirror.

The body had been grown in a vat for the Vacuum Corps. The mind inside it had not.

Colonel Fodder commanded Camp Ragnarok near the center of the Valhalla impact crater. The camp existed mostly underground beneath a dark ice spire rising approximately two hundred meters above the plain. At its natural base, the spire was only forty-five feet wide. A defensive skirt of excavated ice boulders had been piled eighteen meters high around it, giving the bottom the appearance of a much larger mountain that it wished it could be.

Vertical shafts pierced the central core from the buried levels to an observation deck at the pinnacle. Cargo lifts occupied two of them. A ladder filled a third. The fourth had once carried chilled air to the top and now carried ammunition, power cables and, on occasion, a tired worn out gunnery crew.

Over the years, engineers had painted the outer ice with alternating layers of metal resin, a type of ceramic dust embedded with a reflective foil particles. The shell strengthened the spire. It sealed cracks and scattered incoming laser beams before they could deposit enough heat in one place to cut through. In sunlight, the tower shone like a spear. In

Valhalla's long night, it looked like a black tooth, pointing accusingly at Jupiter, hanging low in the airless sky.

Before the Saturnian wars, the pinnacle had been an astronomical observatory. Jupiterian scientists brought Mooninite children up the lifts and showed them Saturn's rings. They enjoyed the view of Jupiter's storms and the tiny moving lights of ships traveling between worlds. The children asked questions and the scientists were happy to answer them. Sometimes the answers led to more questions, and more questions led to more scientists.

When the war began, Fodder put an end to that foolishness. He evicted the telescopes, dismissed the children and installed a cannon. The official name was the Ragnarok Thermo-magnetic Tungsten Projection System. Everyone on the base called it the Spitter.

A fission reactor beneath the pinnacle supplied enough power for the weapon and approximately two and half villages. Its primary coolant loop ran through the cannon's furnace jacket. Conveyor buckets carried nuggets of tungsten up the center shaft from a refinery deep below, where pulverizers consumed regolith mixed with the remains of ancient spacecraft. Magnetic separators extracted iron, nickel and tungsten. Anything that could not be identified was labeled structural alloy and fed into the process anyway.

The refinery produced a tungsten-rich feedstock of inconsistent purity and occasional historical importance. One shift accidentally processed most of the exhibits in the Jupiterian Museum of Ancient Metallurgy.

At the top, the feedstock entered an induction crucible and was heated beyond 3,400 degrees Celsius. The liquid metal did not touch the barrel. Magnetic fields held it in an elongated floating slug while electromagnetic pumps forced it into a disposable carbon sleeve. A bank of pulsed coils then accelerated the sleeve along a forty-meter launch tube in the manner of a coilgun.

The sleeve burned away immediately after leaving the muzzle. The tungsten continued alone, stretched by acceleration and surface tension into a chain of incandescent droplets traveling several kilometers per second.

It looked like a long arching stream of molten metal. It was not, strictly speaking, molten by the time it arrived. In vacuum, the droplets lost heat by radiation but had no air to slow them. Their surfaces froze first, forming thin shells around liquid cores. On impact, each droplet collapsed, flashed part of itself into vapor and transferred its remaining

momentum to whatever large vehicle had made the mistake of being forty-two kilometers away.

The effect resembled being struck by several tons of white-hot gravel thrown by an angry drunk god.

A sensible military would have used solid penetrators. Solid penetrators were easier to store, easier to aim and did not require a refinery, a furnace, four superconducting pump stages, a sacrificial sleeve factory and thirty-seven enlisted technicians whose sole duty was preventing molten tungsten from returning down the ammunition lift. A sensible military also had no need for a weapon of terror.

Fodder considered this lack of complication a design flaw.

The Spitter could fire three streams before its launch coils required cooling. It could sometimes fire four if the commander signed a waiver accepting responsibility for the top of the spire becoming briefly independent of the bottom.

Its maximum practical range was forty-two kilometers. Its minimum safe range was listed as six. Camp Ragnarok itself lay inside that distance, a circumstance the original designers had addressed by underlining the word safe.

Fodder had taken command when Ragnarok was still a wartime research camp. It contained laboratories devoted to thermal weapons, vacuum agriculture, ice fortification, battlefield prosthetics, military psychology and a project whose entire budget description had to shredded, recycled and turned back into paper to print it all out.

He gave every department the same order. Make something that blew up the enemy or start packing.

The thermal weapons team received promotions. The vacuum agriculture team designed an exploding turnip and survived its review by changing its name to Turnip The Heat. The astronomers objected on philosophical grounds and were sacked before lunch.

At first, Fodder regarded the rest of the research as stupid science crap. Then he began reading it.

Ragnarok's genetic engineering laboratory had spent decades studying vat-grown soldiers. Vacuum Corps bodies were designed to be cheap, resilient and obedient enough to survive training. Their nervous systems accepted replacement organs. Their immune systems tolerated battlefield grafts. Their brains arrived mostly empty and acquired

whatever personalities the Corps found lying around.

Fodder became fascinated. He wanted the body without the emptiness. He wanted his Jupiterian mind, his memories, his rank and his appreciation for properly stamped paperwork transferred intact into a soldier body. Not a copy. Not a simulation. Not a new person who merely woke believing it was him. Fodder intended to remain awake throughout the procedure so that he could personally enjoy the result.

That distinction, between original and copy, caused trouble. For years he searched Callisto's ancient ruins for machinery left by the first human civilizations. He requisitioned artifacts, opened sealed burial chambers and reassigned archaeological teams whenever they became sentimental about context. Objects that might preserve memory went to Ragnarok. Objects that did not went into the tungsten refinery.

The camp's scientists told him mind transfer was impossible. Some said identity could not be separated from the physical brain. Others said the process might destroy the original while creating a duplicate. One especially brave neurologist said the colonel's personality might be improved by the attempt.

Fodder court-martialed all of them.

Eventually he found someone with a more constructive attitude. Doctor Pluton had been a Saturnian geneticist before becoming a disgraced Saturnian geneticist, then a fugitive Saturnian geneticist and finally a recently defected Jupiterian patriot. His file accused him of illegal cloning, memory extraction, unauthorized military experiments and making the Saturnian minister of health bark whenever someone rang a bell.

Fodder read the file twice then he requested Pluton's transfer.

They understood one another immediately. Pluton also believed soldier bodies were wasted on soldiers. He spoke of memory as an electrical pattern, identity as a biochemical habit and ethics as a funding problem. Where Ragnarok's staff saw death, duplication and irreversible neurological damage, Pluton saw opportunity.

He cleaned out the existing genetic laboratory within a fortnight. Scientists who remained loyal to accepted medical practice were dismissed. Scientists who remained loyal to Fodder were tolerated. Scientists loyal to Pluton were given keys. Soon the laboratory answered to the doctor alone.

The work took years. They grew bodies and tested them. They

transferred memories into tissue that wanted to revert to unicellularism. They awakened one soldier with Fodder's childhood but none of his adulthood. Another possessed his military education and an overpowering love for a schoolteacher the colonel had hated. A trio of them saluted continuously for nine days.

Fodder ordered them to continue, then ordered the scientists to make more.

Pluton refined the process. He mapped the colonel's nervous system, recorded chemical states during sleep and constructed a bridge that allowed two brains to share sensory information. For eleven seconds, Fodder could see through the eyes of a vat soldier lying on the other side of the laboratory.

The soldier looked back at him in his mind's eye. The two of them laughed like cereal killers in a breakfast factory. That was how Pluton knew they were close.

Their eventual success took place beneath the spire while the Spitter fired test streams across the crater. Fodder entered the laboratory in the body Jupiter had given him. He emerged forty-one hours later in the body the Vacuum Corps had grown for somebody else.

His first act was to stand. His second was to fall because his center of gravity had moved nearly half a meter upward. His third was to court-martial the orderly who laughed.

Within a week, he could run. Within a month, he could climb the central ladder from the buried command level to the old observatory without stopping. At the pinnacle he stood beneath the tungsten cannon, looked out over Valhalla and saw the horizon from a height his species had never intended him to possess.

He was still Colonel Fodder, right down to the old face Doctor Pluton’s crack team of plastic surgeons had reconstructed for him. So absolute was his certainty that he ordered his former, comatose Jupiterian body recycled. He personally shoved it into the incinerator before it could wake up and argue the point with him.

Then Camp Ragnarok lost contact with the outside world. The radios filled with silence. Supply hoppers stopped arriving. Automated messages went unanswered. Fodder's staff searched every military frequency and received nothing but static and fragments of their own transmissions reflected through the ice.

Someone reported Saturnian movement beyond the crater. Someone

else reported that every Jupiterian base on Callisto had fallen. Neither report had a source, which made both official.

Fodder sealed the tunnels, activated the Spitter and placed Ragnarok under siege protocols.

The scientists went underground. The soldiers took positions in the ice. Doctor Pluton locked the genetic laboratory and changed the codes. At the pinnacle, molten tungsten began to glow inside the magnetic crucible.

Colonel Fodder waited for the Saturnians to come. Ten years later, he was still waiting.

CHAPTER FIFTY-NINE THE ARTIFACT - HINT ITS NOT REAL

Bo finally reached the underground entrance to Camp Ragnarok.

For the last two kilometers, he had dragged Moe by his left boot. At first Bo had carried him over one shoulder. Then he had carried him across both arms. Then he had tied a strap around Moe's boot and dragged him. By the time the tunnel leveled out, Bo had settled on the boot because it was the only part of Moe that offered a convenient handle and did not groan when it struck the wall.

Moe's helmet had continued breathing for him. Mostly. Serj's helmet, still strapped to Moe's back, had continued blinking.

The service tunnel ended at a flat circular wall. A heavy door occupied its center. Its seams were so narrow Bo did not see them until his shoulder lights swept across the metal. Above the door hung a sign covered in letters he could not read. Beside it was a small speaker, a button and a grille clogged with dust.

There was no doorknob. There was no OPEN button.

Bo kicked the door. Nothing happened. He kicked it harder. The sound traveled up his leg and settled in his teeth. Nothing continued happening. He gave up and pressed the intercom button. “Hello!”

Static answered.

“That's the dumbest door bell sound I've ever heard,” he muttered and pressed it again. More static.

On the fourth attempt, a tired voice said, “What do you want?”

Bo leaned toward the grille. He was about to ask what was wrong with their doorbell when he remembered something Serj had said. “Uh, I'm here for the deal.”

There was a pause. “Deal? You mean five pizzas for fifty bucks?”

“No. I'm not your delivery boy.”

“Then the deal doesn't apply.”

“Look, I have the artifact thingee to trade with Colonel Fodder. That's the deal.”

“What toppings?”

“On the artifact?”

“On the pizzas.”

“I don't have any pizzas!”

“Then why did you say you were here for the deal?”

Bo argued with the voice until the voice began explaining that delivery fees were not included within the forty-two-kilometer defensive perimeter.

Bo pulled Moe's pistol from its holster and shot the intercom. The grille erupted in sparks. The voice stopped talking about pizza. Bo put the pistol away, grabbed Moe's boot and started back down the tunnel.

He had dragged Moe almost thirty meters when the door opened behind him. Light poured into the passage.

“Hey!” someone called. “Sorry. We thought you were the pizza delivery guy. You can come in now.”

Bo stopped. He looked down at Moe. “This is it Moe. What do you say? Do we go for the deal or try our luck with the drills?”

Moe offered no opinion.

“I agree,” Bo said, “Go big or go home.”

Bo dragged him through the open door.

Inside a modified vat soldier wearing Jupiterian fatigues waited for them. He was short and narrow, with dark skin, oversized boots and a uniform jacket whose sleeves had been rolled up seven times just to expose the ends of his fingers at then ends of short arms. A recruit's stripe had been sewn upside down on one shoulder.

The recruit looked at the scorched remains of the intercom. Then he looked at Bo.

“What's your problem?” Bo asked.

“Thanks for asking,” the recruit said.

He began listing them. His left lung had been replaced twice. His right lung had been moved six centimeters downward to make room for an experimental liver that had later leaked out. His knees bent properly but at inappropriate moments. One ear heard radio frequencies and the other heard only other people’s bowels moving. His fingertips had been removed, regrown and installed in a different order. For three months, his spine had been as flexible as a wet noddle.

Bo followed him into Camp Ragnarok while the list continued.

The base seemed designed by people who had learned about buildings from children's drawings of ancient temples. Corridors crossed at steep angles and ended in staircases. Staircases descended to ramps that climbed back to the floor they had started on. Empty rooms opened into larger empty rooms. Some sections could be reached only by extendable bridges spanning shafts so deep that Bo's shoulder lights disappeared into them.

The color scheme was equally baffling. Bright primary colors with black lines separating walls at odd angles.

The recruit crossed a bridge without looking down.

Bo dragged Moe across it sideways.

The bridge retracted while Moe was still halfway over. Bo caught his ankle and hauled him to safety. Serj's helmet struck the railing and triggered an air raid siren.

The recruit winched in embarrassment and quickly shut the siren off. “Sorry about that. So I was describing my pancreas…”

After what seeming like an eternity in a fun house of smoke and mirrors they arrived at the lobby to a medical theater. The recruit waved at the ticket booth. “They know me, so we can get in for free.”

The recruit paused, turned to Bo and pointed at a set of lockers. Bo knew the drill. He opened a locker then stuffed Moe’s body in and slammed the door. The door didn’t close but bounced back open. Bo shrugged.

The recruit let Bo up a set of carpeted stairs. At the top was a landing and a balcony with plush theater seats surrounding a small auditorium. Tiered seats surrounded and overlooked a glass-walled surgical floor. Below, six masked figures stood around a body secured beneath metal arms, lamps and a machine that appeared to be sorting its organs alphabetically.

The recruit ushered Bo to his seat and left without concluding his medical history.

Bo plopped down next to a gray-haired vat soldier. The soldier wore a colonel's uniform without a helmet. He had an older man's face arranged over a young soldier's skull. It fit well enough until he smiled, when the skin near one ear pulled in the wrong direction.

Bo looked around.

“Where's the popcorn?”

The gray-haired soldier ignored the question and pointed through the glass. “They're rebuilding the subject's peripheral nervous system. The original nerves rejected the third spinal graft, so Doctor Pluton's team is replacing them with conductive bacterial fibers.”

Bo watched one of the surgical arms pull something wet and stringy from the body. “When does it get interesting?”

“This is the interesting part.”

“Looks like they're making spaghetti.” The operation bored Bo to tears. He slumped lower in his seat.

Below, an orderly passed an organ to another orderly, who checked a label and passed it back.

“When are they gonna take me to see the colonel?” Bo asked. “I don't have all day, you know.”

The gray-haired soldier laughed. “Colonel Fodder?”

“Yeah, that’s the one.”

“No, I’m Colonel Fodder.” He held out his hand.

Bo frowned at it. “You sure about that?”

Fodder pulled an old photograph from his uniform. It showed a natural Jupiterian officer in formal dress: short, broad and folded into himself like an expensive chair. He had the same eyes, the same mouth and the same expression of having found fault with whoever was holding the camera.

Bo compared the picture with the tall soldier beside him. Then he handed it back. “Okay, close enough, I guess. So is this where we make the deal?”

Fodder laughed again. “No. First I give you the grand tour.”

“Okay, sure.”

On the way out, Bo opened a locker and retrieved Moe's body. Most of Moe had not fit inside, so Bo had closed the door on his right arm and left his legs extending into the lobby.

Fodder raised an eyebrow. “Who's this, then?”

“A friend of mine. He lost half his brain to a laser. I was hoping to get him a bionic body on Ganymede with the reward money.”

Fodder studied the hole through Moe's visor. “Let me take care of this for you. On the house.”

Two orderlies emerged from the theater pushing a cart. The cadaver from the surgical floor lay on it beneath a thin sheet. Several tubes still connected it to machines that were no longer coming with it.

Fodder stopped them then removed the sheet, inspected the cadaver and tipped it onto the floor. He ordered the orderlies to place Moe on the empty cart.

As they did, Serj's helmet swung out from beneath him.

Fodder stopped and leaned close to the visor. “Oh. I wondered where you got to.”

Bo realized Serj was still strapped to Moe's back. “Sorry about that, sir. If you point me toward the nearest rubbish bin, I'll toss him right in.”

“Nonsense. Any friend of Serj is a friend of mine.” Fodder ordered the orderlies to take the bodies, or parts of bodies, to Laboratory Seventeen.

They saluted and wheeled Moe and Serj away. The discarded cadaver remained on the floor.

As they walked, Bo noticed how few soldiers occupied the base. The ones he saw were mostly vat rejects in oversized fatigues and various states of abnormality. One had three arms and carried nothing. Another had no arms and carried a clipboard in his teeth. Two identical soldiers passed them arguing over which one had been promoted.

Fodder led Bo to a coffee shop a short walk from the theater. Its sign advertised thirty one flavors of coffee. Bo ordered a suicide swirl: all the flavors mixed together while the cup spun slowly below it.

The coffee shop was empty except for a barista whose skin changed color each time he passed beneath a ceiling light.

Bo and Fodder sat at a small table.

Bo leaned back and folded his arms. “I’m changing the deal.”

Fodder raised his eyebrow.

“First fix up my friend, then we can talk.”

Fodder smiled and shook his head in wonder. “Of course.” He waited.

Bo waited harder.

“May I at least see the artifact?” Fodder asked.

“First the reward.”

Fodder snapped his fingers.

The barista reached beneath the counter and returned with a plastic briefcase. He set it on the table. Fodder opened the clasps, lifted the lid and spun the case toward Bo. Inside were stacks of high-denomination Jupiterian script and brightly colored casino chips packed into foam slots.

Bo stared at them. The script he had used aboard the Arley Mith was low denomination. It had pictures of famous officers and warnings against spending it. He had never entered a casino. For all he knew, the chips in front of him were buttons.

He nodded as though ten million dollars looked exactly the way he had expected. “Seems about right.”

Fodder closed the case.

Bo tried to remember how people completed deals. There was supposed to be bluffing. There was often a table. Both of those conditions had been satisfied.

“You don't have it, do you?” Fodder asked.

“Yes, I do.” Bo searched his pockets. He found two empty food pouches, a bent detonator cap, half a pencil, somebody else's tooth and a green piece of fungus he had been saving. “Serj hid it on me,” he said. “But he didn't tell me where.”

Fodder laughed. “The artifact isn't in your pocket, Bo.”

“Sure it is. Hold on.” He pulled out a stick of petrified chewing gum. He sniffed it then tossed it in his mouth.

“No. It's you.”

Bo stopped trying to chew the petrified gum. “What?”

“More specifically, your good luck.”

Bo stared at him and snorted. “I don't have good luck. All my friends have been blown to hell. How is that good luck?”

Fodder drew a pistol and fired at Bo across the table. The pistol exploded in the colonel's hand. Metal fragments struck the wall behind him. The muzzle spun across the floor while smoke curled from what remained of the grip. Fodder's palm opened in three places and began dripping blood onto the table while he laughed out loud.

Bo had not moved.

The barista came over with a wet rag and wrapped it around the colonel's hand. Fodder continued chuckling like having his fingers blown off was the funniest joke in the universe. He grinned at Bo. “That looks a lot like luck to me.”

“Looks like a defective pistol to me.”

“Serj transmitted hours of footage to me. You survived atmospheric descent without a jetpack. You survived tungsten artillery, reactor failures, collapsing tunnels, laser fire, grenades, vehicle crashes and a head wound that should have vaporized everything between your ears.”

“Maybe there wasn't much there to begin with.”

“Yet here you stand without a scratch on you.”

Bo looked down at his combat suit. He turned one arm over, then the other. The armor was scorched, dented, punctured, patched and coated with several kinds of dried bodily fluid. He could not find an actual scratch. “I don't get it. You want me to help you cheat at poker or something?”

Fodder rose. Blood soaked through the rag around his hand. “Something like that.” He picked up the plastic briefcase with his uninjured hand. “Come on. Let's continue the tour.”

CHAPTER SIXTY TOP OF THE WORLD AND A TUNGSTEN CANON

Camp Ragnarok was an odd mixture of a fun house and a medical crime. The floors changed direction without warning. Doors opened onto walls. One corridor rotated slowly enough that Bo did not notice until he passed the same statue fountain three times. Speakers hidden in the ceiling whispered evacuation instructions for emergencies that had ended years ago.

Between these attractions were laboratories. Through one window, a row of vat soldiers slept upright in glass cylinders while mechanical arms changed their faces. Through another, three surgeons argued over which end of a patient the food went in to. A Mooninite orderly pushed a cart of labeled organs past Bo, stopped to count them and ran back the way he had come.

Everyone Bo met was a little off his rocker. Some of them had more than one rocker and disagreed with themselves about which one to use.

Colonel Fodder led the way with the plastic briefcase tucked beneath his uninjured arm. His wounded hand had been wrapped in a fresh silver dressing. He did not appear troubled by the fact that his pistol had exploded while he was holding it.

“We run on a skeleton crew,” Fodder explained.

A skeleton in fatigues stepped from a side passage carrying a mop. Bo pointed.

“Not literally. That is Corporal Omes. We are experimenting with transparent skin as a form of camoflauge.”

The ethereal Corporal Omes saluted with the mop and continued working.

“Most of the base is automated," Fodder continued. “Power, air, refining, defense, surgery, food production. Ragnarok can operate for a hundred years without outside support.”

A ceiling panel fell behind them. “Most of it,” Fodder amended.

They reached a narrow elevator at the center of the spire. Its cage was made of rusted metal bars. The floor tilted toward the shaft, and a handwritten sign advised passengers not to stand on any part of it.

Fodder pulled the gate shut and pressed the top button. The elevator

dropped. Bo grabbed the bars.

It stopped one level below, groaned dramatically, then began climbing. The car rattled up the central shaft. Ice walls flashed beyond the cage. Power conduits, coolant pipes and conveyor buckets passed within reach. Every few seconds the elevator struck something then leaned in a new direction.

Halfway up, it stopped beside a landing with no door. A recorded voice announced, “Pinnacle level. Please exit.”

Fodder kicked the control panel. The elevator resumed climbing.

“How often does it do that?” Bo asked.

“Only when someone is aboard.”

The air grew warmer near the top. A deep electrical pulse traveled through the cage and made Bo's teeth itch. The conveyor beside them carried black lumps upward in little metal buckets.

“Tungsten,” Fodder said, “Has one of the highest densities of any element. A scientist once told me that.”

“What a scientist?” Bo asked.

“A poor son of bitch too dumb to be a soldier.”

One lump fell from a bucket and struck the roof of the elevator. “Don’t worry, it’s not molten yet.”

At last the car shuddered to a halt beneath the pinnacle. They climbed a final spiral stair to a leaky airlock then entered the old observatory deck.

The Spitter occupied nearly all of it. Its induction crucible glowed behind thick shielding. Superconducting coils surrounded the long launch tube in rings larger than Bo. Coolant lines trembled along the floor. Robotic arms carried feedstock from the conveyor, tested it, rejected it, reconsidered and dropped it into the furnace anyway.

Beyond the weapon, a low ice wall looked out over Valhalla.

Fodder spread his arms. “Ragnarok's Thermomagnetic Tungsten Projection System. Fully automated targeting. Fully automated refining and firing.” Somewhere along the way Fodder had found a helmet that sealed itself on his fatigues.

A warning light began flashing.

Fodder slapped it until it stopped. “Mostly automated maintenance.” He

showed Bo the crucible where tungsten became a floating white-hot slug. He showed him the carbon sleeves and the pulsed magnetic coils.

He showed him a tracking display crowded with moving points of light. “Every point is a Saturnian unit,” Fodder said. “The system identifies their vehicles, calculates a trajectory and sends them a stream of refined military history.”

Far below, a target marker turned red. The whole deck hummed. Molten light raced down the launch tube. The spire flexed beneath them. Several seconds later, a tiny flash appeared on the dark plain beyond the windows.

Fodder smiled. “Guess how many Saturnians it kills every day?”

Bo considered the size of the cannon. “Hundreds?”

“Thousands. Over ten years since the siege began, my confirmed estimate is well into the billions.”

Bo coughed. “Uh. About that.”

Fodder turned from the view tucking his exposed wounded hand under his other arm.

Bo explained the radio frequency mix-up. He explained how Jupiter had changed every Callistonian military frequency without informing Camp Ragnarok. He explained how Ragnarok assumed the rest of Callisto had fallen to Saturn, while the rest of Callisto assumed Ragnarok had fallen to Saturn. He explained that Saturn had withdrawn after Jupiter destroyed Titan and, except for Arles, had not had soldiers on Callisto in years.

Fodder's eyes widened. For a moment he said nothing. Then he laughed. He bent forward and braced his good hand against the targeting console. The laugh became a wheeze, then a howl. He tried to speak twice and failed. Tears ran down his reconstructed face. One of the automated sights selected a new target and chimed politely while he struggled for breath.

Bo waited.

Fodder continued laughing for more than a minute. When he finally regained control, he wiped his eyes and patted Bo on the shoulder. “See? You're my good-luck charm already. Without you, I might not have figured that out for another ten years.”

Bo looked at the tracking display. A red point vanished.

They stood at the ice wall and looked into the Callistonian night. Several carriers crossed the sky as moving stars. Smaller lights descended from them toward the plains. Across the rugged terrain surrounding Ragnarok, laser flashes marked skirmishes among distant vehicles and troops.

Fodder shook his head with admiration. “So all those Saturnians we've been fighting are Jupiterian Vacuum Corps?”

“Uh, yep. As far as I know.”

The Colonel looked up at the carriers orbiting high over head. “And those are Jupiterian carrier ships them full of Jupiterian soldiers?”

“Yep. I rode in on one a few weeks ago.”

“Amazing.”

Another target marker turned red behind them. The Spitter fired and the pinnacle shook.

“Yeah! Got another one!”

When the vibrations died down Bo asked, “Can I ask a dumb question?”

“There are no dumb questions,” the C+olonel answered, “Only dumb answers.”

“So if I'm really this artifact, then Serj never planned to share the money with me, did he?”

Fodder nodded. “No.”

Bo stared into the dark.

“But the joke is on them,” Fodder continued. He placed his good hand on Bo’s shoulder. “Even with all the money in the world, they would not have gotten far. This moon is a death trap. I should know, I set most of them myself.”

“So what about me?”

“All I ask is that you remain here and share your good luck with me. You may have the run of the entire base. Ragnarok is stockpiled with ancient artifacts, Saturnian scientific apparatuses and devices nobody has been brave enough to plug in. Doesn't that sound like fun?”

“What if I say no?”

“Give me one day to convince you. Then you can decide.”

Bo thought about it. “I can decide right now with one question.”

“Hit me.”

“If I stay, can you help me get revenge for all my friends who got killed back there?” Bo thumbed behind him, indicating approximately half of Callisto.

Fodder's amusement faded. He looked out over the firefights and thought for a long time. Then he nodded slowly. “I think something can be arranged.”

They rode the rickety elevator back down. At the bottom and orderly had a new hand waiting for him. The colonel stuck his hand into a large black box. There was a loud crunching sound and he winced a bit. The orderly placed the new hand into a hopper on the other side of the box and pressed a button. The hand was sucked inside. After a few more minutes and the sound of an angle grinder he pulled out his fresh new hand. It’s skin colored matched the rest of him and everything.

Fodder's office was the size of a warehouse and appeared to continue in several directions at once. Shelves rose into darkness. Display cases held carved Mooninite stones, Saturnian instruments, melted weapons, mechanical animals and machines whose purposes had been lost while their power lights remained on. An ancient vehicle hung upside down from the ceiling. A glass jar on Fodder's desk contained a small storm.

The colonel settled behind the desk, lit a cigar and put his boots up beside the jar.

Bo took the chair opposite him. It adjusted itself around his body, decided he was shaped incorrectly and began adjusting again.

“If you permit my scientists to examine you for a week or two,” Fodder began, “we will determine how your luck works and reverse-engineer it. After that, you will be free to leave.” Smoke curled around his gray hair. “Although I hope you stay. You could join in all the fun.”

Bo looked around at the little shop of horrors they were in. “What fun?”

Fodder gestured at the warehouse around them. “Experimenting with old technology and determining whether it can blow things up.”

Bo had to admit that sounded extremely appealing.

“Assuming you finish your revenge and leave, where will you go?” Fodder asked. “What will you do?”

Bo thought about it and found very little waiting for him. “Guess I'd go back to Io. See if anything of Granny's farm still exists.”

Fodder snapped his fingers and pressed a button on a small console. Something moved in the shadows above them. A circular CRT twelve feet in diameter descended from the ceiling on heavy chains. Its glass face was curved like the front of a building. Dust rolled off it in sheets as it stopped behind the desk.

Bo looked up. ”Didn't see that before.”

“I hear that a lot around this place.”

The screen came alive in black and white. Static collapsed into an image of Io. Fodder turned a knob. The picture suddenly bloomed into color.

Bo stood so quickly the chair folded itself shut behind him. “What kind of magic is this? Are you some kind of a wizard?”

Bo had never seen color on a screen. Bo had no idea what magic or a wizard was. He had hear some wresting commentator say that after a surprise win.

The program was a documentary about how the Granny Farm children's book had been adapted into a children's television show. A cheerful narrator praised its practical sets and traditional values. Then Granny's farm appeared in Technicolor Astound-A-Vision.

It was exactly as Bo remembered it. The red barn. The crooked fence. The animals crowding around the trough. Foster children ran between rows of vegetables while Granny scattered feed to chickens from a metal bucket.

Bo moved closer to the screen.

The camera pulled back. The farm was a television set. The barn had no rear wall. The fields ended at painted scenery. The animals were guided by handlers just beyond the frame. Granny handed her feed bucket to an assistant and stepped beneath a light while someone repaired her makeup.

The camera pulled back farther. The entire set stood beneath a dome on a scorched, lava-scarred hellscape. Mining machines tore open the ground in every direction. Smoke rose from refineries. Jupiter hung huge in the sky, overseeing it all.

Bo watched without speaking.

Fodder drew on his cigar. “I'm a vat soldier now, just like you,” he said. “Only wiser and older.” He touched his hair. “I paid extra for the gray.”

Bo continued staring at the false farm.

“You see, Bo, hard work and loyalty to Jupiter have rewards. I made my way through the ranks for more than sixty years. And now I'm on top of the world.”

Bo looked around the warehouse buried beneath two hundred meters of reinforced ice. “Looks like the bottom of an ice spire to me.”

CHAPTER SIXTY-ONE FREAKY GUEST ROOM

Colonel Fodder took Bo down a corridor with a ceiling so low they both had to stoop.

The passage continued much farther than seemed possible inside the base. Its smooth white walls curved gently to the left, then to the right, then seemed to curve in both directions at once. Doors appeared at irregular intervals. Some were waist-high. One was painted onto the wall. Another opened as they passed and released a flock of paper birds that flew into an air vent.

Fodder ignored them.

At the end of the corridor, he stopped beside a narrow opening.

“Get a good night's sleep,” he said. “In the morning, we'll speak with the good Professor Pluton.”

“Is he a wizard too?”

“Only when the equipment works.”

Bo stepped inside.

The room was circular. A circular bed filled its center. The walls were made of seamless translucent glass that glowed with a pale blue light. There was no nightstand, no television and no visible furniture apart from the bed. Everything looked smooth, expensive and recently provisioned.

The door closed behind him without making a sound.

Bo sat on the bed. It rotated a few centimeters beneath his weight, then stopped with his feet pointing toward a different wall.

He remembered something he'd meant to ask the colonel and jumped up.

But the door was gone.

He ran his hands over the glass. There was no knob, no seam and no button. He pushed where the opening had been. The wall remained a wall.

“How do I use the toilet?” he yelled.

Fodder's voice came faintly through the glass.

“There's a bucket under the bed.”

Bo looked beneath it.

There was. The bucket was also circular.

Bo lay down fully dressed. The mattress adjusted itself around him, pulling his arms and legs into positions it considered restful. He fought it for several minutes, lost and decided the bed probably knew more about sleeping than he did.

The glass walls dimmed.

Somewhere beyond them, machinery clicked.

Bo dreamed of drills.

They entered his body from every direction. Thin drills bored through his fingertips. Wide drills descended through his skull. Spiral cutters pushed through his knees, his back and the repaired hole in his head. None of them hurt. That made it worse.

Giant clowns stood around him laughing. Their faces were painted on in thick white layers. Their mouths opened too far. Their teeth were tiny doors.

Jokers climbed out of the clowns.

They poured from mouths, noses and ears in Jupiterian uniforms. Some wore jetpacks. Some carried rifles. Some had no eyes. They slid down painted cheeks and charged across the floor toward Bo.

Bo was a giant too. His head struck the ceiling of the dream. He tried to step on the jokers, but each one he crushed became two. They climbed his boots, crossed his legs and swarmed over his body.

Then they found his holes. The same jokers that had crawled out of the clowns began crawling into Bo. They entered through his ears, his nose, the laser hole in his skull and every opening the drills had made. One paused on the rim of his visor, waved and disappeared inside.

The clowns laughed harder.

Bo looked down and saw that his mouth had become another clown mouth.

Something inside him knocked.

He woke naked. For several seconds the dream remained superimposed over the room. Tiny soldiers ran across the translucent walls. A drill withdrew into the ceiling. A clown's eye blinked beneath the floor.

Then everything became smooth glass again.

Bo sat up.

His combat suit was gone. So were his boots, helmet, rebar and Moe's pistol. He searched beneath the bed and found only the bucket. He searched the bucket and found nothing he wanted back.

“Hey! Where'd my stuff go?”

No one answered.

The bed began sinking into the floor.

Bo scrambled off. The mattress, frame and blankets descended through a circular opening and vanished. The floor sealed over them. A moment later it opened again and a cylindrical shower rose into the room.

Warm mist filled the glass enclosure.

Bo sighed. “Well, I guess it's time for the first of my twice-weekly showers.”

He stepped inside. “For Ricia.”

But it not the torture he'd long assumed it to be. It was actually enjoyable if he kept the water out of the hole in his head.

Water struck him from twelve directions. The shower produced soap from the walls, shampoo from the ceiling and a toothbrush from a slot at waist height.

Bo brushed his teeth while the floor rotated beneath him. Whenever he faced the door, the shower turned him away from it.

The water stopped before he had decided he was finished.

Bo stepped out dripping.

A huge hot-air blower descended from the ceiling. It aimed itself at him and roared. The blast pushed his cheeks backward and inflated his afro into a dark halo. He leaned into the wind until he could stand upright.

One of the smooth walls turned into a mirror.

Bo admired himself. Without a helmet crushing it flat, his clean afro seemed almost twice the size of his head. He turned sideways. The hair

turned a moment later, as though the reflection needed time to catch up with reality.

A knock came from the wall. A door appeared and a cute nurse stood outside holding folded fatigues. She had bright eyes, neat black hair and a smile that made Bo forget for a moment that his clothes had been stolen while he slept.

She handed him the uniform without a word.

“Oh, wow.” He had not worn ordinary fatigues since the Arley Mith. The cloth felt light after weeks inside armor. The shirt fit his shoulders. The trousers had exactly the correct number of legs. Nothing sealed, hissed or announced that his actions would be reported.

It was a welcome change of pace.

After Bo dressed, the blower retracted into the ceiling. The shower sank into the floor. A round kitchen table rose in its place with a chair already tucked beneath it.

The nurse returned carrying a tray.

Breakfast covered every part of it. There were eggs with yellow centers, strips of bacon, sausages, buttered toast and little glass jars of red and purple jelly. Steam rose from the food. Grease shone on the bacon. Nothing came from a pouch, tube or fungus mat.

Bo sat down slowly. “Is it real?”

The nurse nodded.

He tasted the eggs first. Then the bacon. Then everything at once.

It was all real.

Bo had never tasted anything so good in his life. He ate with both hands until the tray was empty, then asked for seconds. The nurse brought them. He asked for thirds before finishing the seconds, in case Camp Ragnarok imposed a breakfast limit when nobody was looking.

Halfway through the third plate, his stomach made a noise like the elevator.

Bo stopped chewing. He bent over and vomited into the bucket.

The nurse winked at him.

Bo wiped his mouth. “Still worth it.”

She collected the tray. The table sank into the floor behind her. The

circular bed did not return.

The nurse led Bo out of the room and back along the low corridor.

He walked beside her with his clean afro brushing the ceiling.

“You ever been to Ganymede?” he asked.

She glanced at him.

“They got casinos there. And robot horses, I think. Moe said he was gonna show me, but he got shot in the head. Only half of it, though. Colonel says they're fixing him.”

The nurse smiled politely.

“You don't talk much, do you?”

She stopped walking. Then she opened her mouth. There was no tongue inside it. The smooth pink floor of her mouth ended in a pale surgical seam. Nothing had been cut recently. Whatever had removed her tongue had done so neatly and a long time ago.

Bo stared. “Oh.”

She closed her mouth and continued walking.

Bo followed in silence.

They passed the painted door, the waist-high door and the air vent filled with paper feathers. This time the corridor did not seem as long. It ended at a steel bulkhead marked with a red number seventeen.

Bo could not read the words beneath it but recognized the number and remembered Fodder mentioning it.

The nurse pressed her palm against the wall.

The bulkhead opened, revealing a cold light that spilled across Bo's fresh fatigues.

Somewhere inside Laboratory Seventeen, a scientist cried Eureka!

CHAPTER SIXTY-TWO GIVE IT TWO DAYS

Laboratory Seventeen was a huge circular room with a ceiling four levels high.

Balconies ringed the walls at every level. Silent scientists stood behind their railings and looked down at Bo. Their white coats hung perfectly still. Some held clipboards. Some held surgical instruments. None spoke, preferring to stand perfectly still.

Bo looked up at them.

They looked down at him.

He waved.

A few made note of this but no one waved back.

The tongue-less nurse stepped away as soon as Bo crossed the threshold. The bulkhead closed behind him, leaving no seam in the wall and no obvious way to reopen it.

At the center of the laboratory, three men stood with their backs to him. Two large men in fatigues flanked a much smaller one in a lab coat. All three were staring up at a giant black and white tube type screen suspended from the ceiling.

The screen displayed a human figure made of translucent tissue and glowing bones. It rotated slowly in the air. Bright lines traveled through its nerves. Organs opened into layers, separated and returned to their original positions. A blinking marker highlighted a sealed hole through the back of its skull.

Bo had no idea who it was.

He wondered why the skeleton's arms were different lengths.

The three men turned around.

Colonel Fodder stood on the right with his injured hand wrapped in silver dressing. In the middle was a strange little man wearing giant blue glasses. His gray hair projected from his head in all directions, as though every strand had fled a separate experiment.

On the left stood Serj. He was alive, upright and neatly dressed in the same fresh fatigues Bo wore.

Serj smiled. “Bo! You made it.”

Bo hesitated. “Where's Moe?”

Serj's smile weakened. “It's good to see you too.”

“Moe's the one I made a deal for. Not you. Where is he?”

Fodder glanced at Serj. “This is to be expected,” he said, “Bo has undergone considerable trauma. Give him a few days and he'll be your best buddy again.”

Bo folded his arms.

Serj approached and held out his hand.

Bo looked at it for several seconds before allowing Serj to shake his fist.

Serj was all back together. His face had color. His eyelids no longer fluttered. His neck supported his head in the conventional manner.

“Sorry I didn't tell you we needed your luck,” he said. “None of us would have made it without you.”

“Most of us didn't make it with me.”

Serj looked away.

Bo leaned closer and examined him. “How'd you get your body back? I thought a bear ate it.”

“They grew me a new one and reattached my head. Here look.” He pulled down the collar of his fatigues. A pink scar circled his neck in a perfectly straight line. Small metal staples remained near the spine, arranged like rank insignia. “Not too bad, huh?”

“Where's Moe?” Bo demanded.

The little man in the blue glasses stepped forward. “Professor Pluton,” he said. “Geneticist, neurologist, reconstructive anatomist and interim director of recreational cloning. It is a profound pleasure to meet the statistical irregularity in person.”

He did not offer Bo his hand.

Bo snorted. “I want Moe.”

Pluton adjusted his glasses. They magnified his eyes until they looked too large for his head.

“Oh course. Right this way.”

He led Bo through a side door.

Behind them, Fodder said something to Serj. Both men laughed. The scientists on the balconies continued watching without expression.

The next chamber was long, narrow and filled with giant glass cylinders. Vat soldiers floated asleep inside them in thick amber liquid. Tubes entered their mouths and noses. Their chests expanded as they breathed the fluid. Bubbles rose from their skin and collected beneath metal caps overhead.

Some of the bodies were complete.

Others were still deciding.

One cylinder contained a soldier with four legs and no arms. Another held two torsos joined at the waist, facing opposite directions. A third appeared empty until an eye opened in the liquid and followed Bo past.

Pluton walked between the rows, counting beneath his breath.

Three rows down, he stopped.

Moe floated behind the glass.

His head had been repaired.

The left half of his face was new. The skin was pale white from forehead to chin, divided from the old dark half by a precise vertical seam. The new eyebrow was higher. The new cheek was thinner. The two halves of his mouth disagreed about whether he was frowning.

Bo stared. “Boy, is Moe gonna be mad when he looks in a mirror.”

“The cosmetic mismatch is temporary,” Pluton said. “Or permanent. Pigmentation is a temperamentally complex process.”

A schematic was taped on the cylinder. One half of a brain glowed green in hand painted colors. The other glowed blue.

“The laser destroyed most of the left cerebral hemisphere, along with portions of the eye, temporal bone and skull. Fortunately, the right hemisphere remained sufficiently intact to duplicate.”

“You copied half his brain?”

“We copied the undamaged half, inverted its structural orientation and installed it on the opposite side.”

Pluton moved both hands together as if closing a book.

“It will take several days for the hemispheres to determine which one is in charge and learn how to communicate. Once they establish a workable

disagreement, we can wake him."

Bo pressed his palm to the glass.

Moe drifted closer in the liquid. His old eye remained closed. His new eye opened briefly, looked in the wrong direction and closed again.

"He'll still be Moe?"

Pluton considered the question.

"Both halves will be."

The door opened behind them.

Serj entered and walked up beside Bo.

He looked into the cylinder.

"Boy, is Moe gonna be mad when he looks in a mirror."

Bo turned toward him. "Are you spying on me?"

"Great minds think alike."

"Not ours."

Serj ignored the remark.

"Good news. Fodder says they figured out how to reverse-engineer your luck. One simple procedure. If you let them do it, you'll be free to go in a day or two."

Bo raised an eyebrow. "Me? Really? What about you?"

"I'm staying. Too much fun stuff to play with. You know."

Bo nodded slowly.

Serj sounded cheerful. Too cheerful. The scar around his neck was fresh, his body was newer than his clothes, and his eyes had the bright unfocused look Ricia got after accidentally testing her own medicine.

Bo decided Serj had been drugged. Possibly several times.

"Can we have a moment of privacy?" Bo asked.

"Certainly," Pluton said.

He walked away and stopped beside the very next cylinder.

Bo stared at him.

Pluton moved two cylinders farther down.

Serj looked around to make sure no one was listening. Above them, microphones turned gently on their mounts.

Bo folded his arms. “This had better be good.”

Serj leaned close. “We're not safe here. Fodder isn't who we thought he was.”

“Uh-huh.”

“The deal was a scam. They're not letting us go.”

Bo nodded. “Yeah. So what? You're still a jerk and I don't trust you.”

“I know.”

Bo waited for an argument but the master seargent did not give him one.

“I'm sorry,” Serj whispered. “I thought you could live here and be Fodder's good-luck charm. It was the only way. If I hadn't made the deal, we'd all be dead under a pile of soldiers back at the village.”

“Speak for yourself, buddy. I got out from under that pile.”

“Let's play along until I figure out a way out of here.”

Bo looked at Moe floating behind the glass. “What about him?”

“Two days.”

“That's what they said.”

“Then we give them two days. After that, we take Moe and leave.”

Bo watched the two halves of Moe's face float in the amber light.

At last he nodded. “Okay. I'll give it two days.”

Serj relaxed. “Great. Come on.”

They returned to the main laboratory.

Fodder and Pluton waited beneath the rotating image of Bo's skeleton. The silent scientists leaned over the balcony rails. A wheeled medical cart stood near the door, covered with clamps, tubes, scalpels and syringes filled with liquids of optimistic colors.

Serj smiled at the colonel. “Good news. Bo has agreed to stay.”

Bo stepped beside him. “For two days.”

As they passed the medical cart, Bo selected a syringe at random.

The liquid inside it was bright orange. Its handwritten label contained

six words, none of which he could read.

Bo pulled off the cap with his teeth.

Serj turned toward him. “Hey now, Bo. Put that down.”

Bo drove the needle into Serj's neck and emptied it.

Serj's smile remained in place for half a second.

Then his new knees folded and he collapsed onto the floor.

Everyone stared.

Bo threw the syringe at Professor Pluton like a dart then ran.

The syringe embedded itself in the back of the professor's clipboard. Pluton looked at it confused.

CHAPTER SIXTY-THREE HONEST, WE PROMISE

The first announcement followed Bo into the ventilation system.

“Bo,” Colonel Fodder said, his voice softened by speakers large enough to direct artillery. “Come back. All we want to do is study you for a few days, and then we'll let you go.”

A second voice joined him. “Honest,” Serj said.

Professor Pluton added, “We promise.”

The three voices rolled through the ducts, overlapped, separated and returned from six directions at once.

Bo crawled faster.

He did not believe any of them. He was beginning to suspect he had been too trusting back when he had believed none of them.

Below him, Camp Ragnarok had mobilized.

Fodder, Serj and Pluton patrolled the base separately on command chairs bolted to hoverboards. Each chair had padded armrests, a rotating cup holder and a bank of switches no one appeared to understand. The boards floated waist-high above the floor and moved with the nervous wobble of serving trays carried by drunk waiters.

Large loudspeakers had been strapped beneath the seats. Their magnets dragged along loose tools as the chairs passed.

Fodder cruised through the museum wing smoking a cigar, one boot propped on an ancient Saturnian death mask.

“Bo, I am not angry about the pistol. A weapon exploding in my hand was scientifically fascinating. Come back and do it again under controlled conditions.”

In the cloning corridor, Pluton drifted sideways because his left steering lever only worked intermittently.

“The procedure is painless,” he announced. “Pain, when present, is generally experienced by someone else.”

Serj circled the dining hall in slow loops.

“Bo, buddy. Nobody is going to force you into anything. We just need you to volunteer. There is a very important difference.”

His hoverboard clipped a table. The command chair spun twice and continued backward. “Also, if you see a steering manual, grab it.”

Bo pressed his cheek to a vent grille and watched Serj disappear around the corner. Then he crawled the other way.

Serj eventually found his way back to Laboratory Seventeen, where Pluton was completing a slow orbit around the pedestal in the center of the room. The silent scientists still occupied the balconies. Several now held butterfly nets.

Serj stepped off his board. It continued forward, struck the giant display controls and made Bo's rotating skeleton turn inside out.

He looked down at his new body.

He flexed one hand. He rolled his shoulders. He pinched the skin over his forearm and watched it slowly return to shape. “No,” he said. “I don't like this body either.”

Pluton made a note on his clipboard.

“The musculature exceeds your original specifications by twelve percent.”

“The left knee clicks. My teeth don't meet right. And I keep remembering a childhood I didn't have.”

“Memory seepage. The body was previously intended for an accountant.”

Serj stared at him.

“How soon can you move me into Bo's body?”

The scientists leaned farther over the rails.

Pluton adjusted his enormous blue glasses and consulted the clipboard. The page was covered in equations, colored arrows and a small drawing of Bo being struck by lightning while everyone around him burned.

“Bo's probability differential is through the roof,” Pluton said. “Possibly through several roofs. Every attempt to take him by force increases the chance that our own actions will defeat us. Needles break. restraints unlatch. Armed guards mistake each other for Saturnians. You may have noticed a pattern.”

Serj rubbed the circular scar around his neck. “What's the clean way?”

Pluton pointed to the machine on the pedestal. It was a giant high-backed chair surrounded by consoles. Tubes and cables snaked away

from its base in every direction, crossing the floor like exposed roots. Above it hung a ring of surgical lights. They glowed cold white, forming a halo over the restraints built into the armrests.

“He must agree to share his luck with you,” Pluton said. “Once he agrees and gets into the chair, the probability field should stop treating us as hostile. Then we have him.”

“And after the transfer?”

“You will be Bo.”

“What happens to the original Bo?”

Pluton turned a page on his clipboard, looked up and shook his head.

They crossed into the adjoining chamber.

A single enormous cylinder stood at its center. Old Colonel Fodder floated inside, naked except for a web of monitoring leads. His gray hair drifted around his head. He pressed both palms to the glass and shouted soundlessly through the fluid.

The Fodder in the cylinder saw Serj and began pounding harder.

Serj looked at the familiar face and smiled. “What's this one's probability differential?”

Pluton examined a meter beside the tube. Its needle trembled below a red line marked DEATHLINE. “Above average.”

Serj tilted his head. “But he's sixty-five years young.”

“Youth is wasted on the young.”

The body in the tube struck the glass with both fists. A crack appeared. Pluton covered it with a strip of tape and marked another item on his clipboard.

Somewhere overhead, Fodder's cheerful amplified voice said, “You may have noticed certain unauthorized versions of me. Please ignore them.”

Serj glanced toward the ceiling. “I wish he'd quit saying that.”

Pluton pushed his glasses higher on his nose. “I did warn you, sir. Twice.”

Meanwhile, Bo reached the end of a duct and kicked out another grille.

He dropped into an empty control room crowded with equipment more advanced than anything aboard the Arley Mith. Colored diagrams flowed across curved screens. Banks of lights pulsed in orderly rhythms. A glass console displayed a perfect model of the base, right down to tiny hover chairs wandering through the halls.

Bo looked for a button marked ESCAPE, but couldn't find one. He could not read any of them so he pressed the largest, reddest one.

A klaxon began screaming. Metal shutters sealed every coffee station in the base.

He pressed a blue one.

Sprinklers sprayed disinfectant foam through the officers' quarters.

He pressed three yellow buttons together.

Every toilet flushed at once. That triggered a second alarm, followed by a calm woman's voice announcing that the hydrostatic defense network had suffered an anomie.

Bo climbed onto the console, reached behind it and pulled out a handful of wires. The lights went dark. The lights came back purple.

The tiny model of the base began listing casualties.

Bo climbed back into the duct.

While personnel rushed through the corridors silencing alarms and fighting the toilets, he visited three more control rooms. In one he reversed every escalator. In another he opened and closed all extendable bridges at random.

He dropped from the duct into the men's locker room looking for someone to punch.

No one was there. Every soldier had been called to duty by the alarms.

Bo stood between the empty benches, angry at the lack of opposition. “Cowards,” he muttered, then kicked a locker.

Its door swung open and his old combat suit fell out on the floor in front of him.

The armor was scratched, scorched and stained with things Ricia had ordered him to wash off weeks ago. One glove was stiff. The helmet still had duct tape across the repaired visor. The suit smelled like mildew,

smoke, fungus and BO (Bo Odor).

“Jackpot.”

He dressed quickly. The seals recognized him after two failed attempts and one accusation of theft.

Fodder's voice thundered from the locker-room speakers. “Bo, we can hear the suit booting. Please remain where you are. A friendly recovery team is on its way. They have been instructed not to frighten you with their nets.”

Bo ran for the elevator shaft.

The elevator hung crooked between two floors. Smoke poured from its control panel, possibly because of something Bo had pressed.

He opened the maintenance hatch and started climbing.

The shaft rose through the core of the ice spire. His boots slipped on the rungs. Below him, voices echoed upward while hoverboards collided with one another in the dark.

“Come back, Bo,” Serj called through the speakers.

“Your luck belongs with people who understand it,” Pluton said.

“And who appreciate you,” Fodder added.

Bo climbed faster. His arms burned the higher and faster he climbed. After a good twenty minutes of climbing he emerged at the pinnacle beside the giant tungsten cannon.

The spitter filled most of the reinforced observation deck. Its reactor growled beneath the floor while the feed system chewed fragments of salvaged metal. Beyond the armored shutters, Jupiterian carriers crossed the black sky like moving stars.

Bo climbed onto the cannon's aiming frame.

He found the manual release, hit it with his elbow and forced the barrel assembly downward until it pointed into the open ammunition shaft.

Warning lights flashed across the controls. The computer objected to firing at the base that powered it.

“Hmm.” Bo reached under the panel and pulled out the wires that looked most argumentative. The objections stopped.

He squeezed both triggers.

A stream of molten tungsten spat straight down the shaft. The entire spire shuddered. A white-orange river vanished into the darkness, shedding incandescent beads that bounced from wall to wall. Something far below exploded. The loudspeakers continued promising Bo his freedom, but each word now arrived stretched, garbled and several seconds apart.

Bo wrapped duct tape around the trigger controls until the spitter kept firing by itself.

Then he jumped down and ran to the edge of the pinnacle. Two hundred meters of reinforced ice fell away beneath him. He looked left then right. He checked his back even though he already knew the answer. No jetpack.

“Crap.”

Below, the spire began glowing from the inside.

Bo leaned over the edge again. Behind the elevator housing, barely visible in the darkness, a small landing pad projected from the pinnacle. A hopper sat on it with its boarding hatch open and its engines idling.

Bo smiled inside his patched helmet.

“Those idiots.”

CHAPTER SIXTY-FOUR THE FISHBOWL

Two days later, Moe woke up naked in a circular room.

This did not confuse him. He had awakened naked in unfamiliar places before. Usually there had been a reasonable explanation, even if he had been the only person willing to call it reasonable. The room was warm, the round bed was soft, and no one appeared to be shooting at him. By recent standards, it was excellent accommodations.

He stretched. Both arms worked. Both legs worked. His skull did not leak. His thoughts lined up in an orderly fashion and waited their turn. Moe decided he was perfectly fine.

The bed descended into the floor with him still on it.

He rolled off just before a shower rose in its place. “Fancy.”

Hot water came from six directions. Moe stood beneath it for a long time, letting days of frozen cave water, dust and other people's blood run into the drain. A dispenser provided soap that smelled like roasted onions. Another provided something labeled CONDITIONER that removed most of the hair from his right forearm.

He did not complain. It was a good shower.

When he stepped out, jets of hot air dried him. One translucent wall darkened, brightened and became a mirror.

Moe leaned close to comb his hair with his fingers. The man in the mirror leaned close too. Half of that man's face was Moe. The other half was white.

A ruler-straight seam ran down the center of his forehead, crossed his nose and divided his lips. His left eyebrow sat higher than the right. One cheek was round and familiar; the other belonged to a thinner man who looked permanently surprised. Even the two halves of his hairline had been negotiated separately.

Moe touched his left cheek. The stranger touched him back. Only then did reality catch up.

“Oh, hell no!”

He backed away from the mirror. “Let me out!”

The hidden door opened and the cute nurse entered carrying breakfast on a silver tray. Bacon-colored strips lay beside eggs molded into

identical yellow cubes. A mound of gray porridge breathed through several small holes.

Moe took one whiff and nearly vomited. “What the hell is this crap?”

The nurse opened her mouth. There was no tongue inside it.

She shook her head sadly and pointed at the tray, as if the food's inability to defend itself had settled the argument. Then she turned to leave.

Moe followed.

Without looking back, the nurse drew a compact taser from her apron and fired it under her arm.

Two barbs struck Moe in the chest. His new left side went rigid first. His old right side attempted to continue walking without it. For several seconds the two halves disputed control, carrying him sideways in a tight circle before he fell.

The nurse retrieved the barbs, smiled and stepped through the doorway. The door vanished behind her.

Moe lay on the floor until both sides of his brain agreed that getting up was their idea.

He searched the room. There was no knob, seam, hinge, button or vent. The bed had disappeared. The shower had disappeared. Even the breakfast withdrew into the floor before he could throw it at anything.

He hammered on the walls. “I know you're out there!”

The walls turned transparent and Moe froze.

His circular room stood in the center of a much larger laboratory. Scientists surrounded it on four rising tiers. Dozens of them watched through the glass, writing on clipboards. Some pointed at Moe. Others pointed at readings on tall machines. One held up a card that read SUBJECT HAS BECOME AWARE OF FACE.

Another scientist crossed out BECOME and wrote BECAME.

Moe stood there naked, with hands on his hips nodding slowly and giving each little scientist his evil eye, the white one.

The scientists wrote faster.

He turned slowly showing them all his business. More scientists

appeared as he turned. There was no behind anymore. He was in a giant fishbowl, and every direction was the front.

“You like what you see?“ he called out, ”You crazy little mother...”

A scientist tapped the glass to see if he would follow the finger.

Moe charged him.

The wall became opaque a moment before impact. Moe bounced off it and landed on the floor. The room was solid white again.

“Damn it!”

He sat with his back against the wall and stared at his mismatched hands. The new one was paler. Its fingerprints ran in the wrong direction. He tried remembering his fake mother's face and saw two different women, both clones of each other. He tried remembering breakfast and tasted the food he had refused to eat. For the first time since waking, his thoughts stopped lining up.

Moe lowered his head and cried.

He did it quietly at first. Then he remembered the scientists were probably recording the volume and cried louder out of spite.

When he finally ran out of anger, he was left with the fishbowl, the white walls and the possibility that half of him belonged to someone who had never existed.

He was about to give up hope when the ceiling began to vibrate. Dust drifted down. A circular shadow formed directly above him.

The scientists, on the other side of the glass stopped their pencils and looked upward. Something enormous struck the ceiling from the other side and then suddenly, a large drill head punched into the room.

It was shaped like a giant screw covered with circular cutter heads, broken teeth and spinning agitators. It chewed through metal, insulation, cables and a water pipe. The drill descended into the larger outer room trailing sparks and pieces of three floors.

The transparent walls of his fishbowl cracked from top to bottom.

Scientists scattered as the entire outer room burst.

Moe rolled beneath a section of falling glass.

The drill stopped a meter above the floor and groaned as its cutters wound down. A hatch opened in its side. Bo leaned out wearing his old

filthy combat suit. Duct tape covered part of his visor. He looked as though he had been operating the machine by surviving inside it. “Moe!”

Moe looked up through the dust. “What took you so long, man?”

“I had to learn how to drive a drill. Come on. Let's go.” He reached down. Moe grabbed his hand, and Bo hauled him onto the drill housing.

The cockpit had two seats, fourteen control sticks and a dashboard covered with warning labels. Half the controls had been tied together with string. A hammer was wedged against the accelerator.

Moe climbed into the empty seat. “Where are we going?”

“Fodder's office.”

“Why?”

“Because this thing only goes in one direction. Down.” Bo pushed three levers forward.

As if to contradict its driver, the drill lurched sideways through the laboratory wall. It crossed a corridor, bored through an empty cloning gallery and dropped down an elevator shaft. Moe grabbed every handle he could reach. Bo steered by leaning his entire body against whichever control seemed least cooperative.

“Do you know where his office is?” Moe shouted.

“Down.”

The drill proved him right this time. It crashed through the ceiling of Colonel Fodder's warehouse-sized office and buried its nose in a display of ancient artillery shells. The command chairs parked behind the desk scattered like frightened furniture.

Moe climbed out and fell onto a rug depicting Jupiter swallowing its moons.

He got to his feet and looked around. Shelves vanished into darkness in every direction. Glass cases held weapons, idols, machines and bones that might have belonged to the same civilization. Gold coins filled an aquarium. A stuffed Saturnian wearing a party hat stood beside a vending machine that sold surgical organs.

“What are we doing here?” Moe asked.

Bo jumped down beside him. “Stealing stuff or breaking stuff. Your choice.”

Moe thought it over. Then he did a little of each. He smashed the nearest glass case and took an object shaped like a pistol. It unfolded into a spoon. He kept it anyway. He kicked over a marble statue of Fodder's former body, then filled its hollow head with casino chips. He found a coat, put it on and discovered the pockets already contained three live mice wearing laboratory tags.

Bo moved from display to display, stuffing anything shiny into his suit. A silver skull disappeared into one pocket. A box labeled DO NOT SHAKE went into another after he shook it. He tried to take a ceremonial spear but it was taller than the corridor they needed to escape through, so he broke it in half.

A row of glass cylinders contained famous generals' brains suspended in clear fluid. Each brain wore a tiny metal helmet. Moe found a control beneath the display and turned it all the way up. The brains began arguing through hidden speakers about which one of them had won a battle none of them remembered.

Bo opened a cabinet full of antique hand grenades. One was ticking. Bo placed that one back carefully.

Something slipped from his pocket and landed face up on the floor. It was his forged identification card.

Bo picked it up. The card identified him as Major General Bo Bovastein. The photograph showed him staring slightly away from the camera because Ary had told him to look official and he had looked in the wrong direction.

He stared at it for a long moment. Then he looked toward the colonel's enormous desk. A communications console occupied one corner beneath a bank of screens.

Bo smiled. “Hold on.”

Moe was attempting to pry a ruby eye from a statue with the folding spoon. “Don't be bogarting the good stuff on me, Bo.”

Bo tucked the major general's credentials into his chest pocket and headed for the console. “Hold on. I have to make a very important phone call.”

CHAPTER SIXTY-FIVE CONQUERING THE PEACE

Up aboard the Arley Mith, the Council of Lieutenant Colonels had been convened.

This was not only unusual. It was annoying. All ten lieutenant colonels assigned to the carrier had been called up for duty at the same time. Even those whose soldiers remained safely frozen in reserve had been forced to leave the Jupiter-gravity hot tubs, surrender their massage appointments and sit in the same room with one another.

They had been ordered to talk about business. The business was war.

None of them had dressed for it. Lieutenant Colonel Rchibald Aglund wore a bathrobe over his uniform blouse. His empty trouser legs were tied together beneath his wheelie cart so they would not drag. Lieutenant Colonel Ayewether arrived with hot stones balanced across both shoulders. Onaldson had brought a masseuse and claimed she was his adjutant. Iller wore a cucumber slice over one eye and used the other to glare at everyone equally.

At this point in the Arley Mith's deployment, three hundred thousand units had been activated and sent into service on Callisto.

Units was the preferred word. Troops suggested people. Service suggested war. Ground operations suggested that someone might eventually ask what had happened on the ground.

Rchibald had expended nearly all his units already. He had therefore been prepared for a long siesta while the remaining lieutenant colonels depleted the carrier and caused it to be ordered back to Jupiter for resupply. By long-standing custom, an officer who ran out of soldiers before everyone else had completed his portion of the campaign.

Two lieutenant colonels still had active units in the field. This meant they were supposed to be on active duty themselves, although active duty consisted primarily of remaining in orbit and asking the surface why it had not yet won. The other eight had planned their leisure accordingly.

Calling all ten into council was unheard of. More importantly, it was an affront to the way of life they had come to expect and enjoy.

The council chamber had been designed to prevent physical closeness between officers of equal rank. A circular table more than thirty feet across occupied the center of the room. Its middle consisted of a twenty-

seven-foot hole, leaving only a narrow ring of polished wood around the outside.

The lieutenant colonels sat approximately ten feet apart around it, which required portions of the table to exist in dimensions the shipwrights had not disclosed.

Starting at the main hatch, they were seated by last name: Rchibald, Ayewether, Atton, Onaldson, Iller, Mith, Heeseman, Angworth, Rtridge and Opinhopper.

Mith was the grandson of Arley Mith, for whom the carrier had been named. He mentioned this whenever someone asked why he was there and frequently when no one did.

Usan Opinhopper was the only woman on the council. Her reserve troops were scheduled to be activated last, which had entitled her to a two-month vacation while other people's units were consumed first. She had been on her way to Ganymede when the emergency summons reached her. Her Away Ship had expended thirty-seven bombs changing course and returning to the Arley Mith in time. The maneuver had destroyed a communications satellite, frightened two cargo haulers and shortened the vessel by eleven feet.

Opinhopper rolled into the chamber on her wheelie cart twenty minutes late. She wore mirrored vacation goggles and still had a drink umbrella tucked behind one ear.

Rchibald turned his cart toward her. “Nice of you to finally join us, Usan.”

“I was off duty.”

“We are all off duty. That's why this meeting is so serious.”

They had spent the previous eighteen minutes arguing about who had called it.

Ayewether accused Atton because Atton still had brigades on the surface. Atton accused Rchibald because Rchibald was almost out of soldiers and therefore had something to gain from stopping everyone else. Rchibald accused Mith because the meeting had taken place on the carrier bearing his grandfather's name.

Mith accepted responsibility for the carrier but denied responsibility for anything occurring aboard it.

Heeseman threatened to have the minutes classified unless his name

was removed from them. Rtridge threatened to classify Heeseman. Iller said nothing but slowly removed the cucumber slice from his eye, which everyone took as a veiled threat.

At the center of the great hole stood a color cathode-ray tube mounted on a rotating pole. The screen was ten feet wide and nearly as deep. Heavy motors allowed it to travel around the hollow center of the table, turning to face each officer in succession.

The machine existed so no lieutenant colonel would have to move his chair to see a presentation.

A tone sounded. The screen flashed blue, green, red and a color the manufacturer insisted was flesh and then a face appeared.

It was Bo Bovastein's face.

No one in the chamber knew that. As far as the council was concerned, he could have been the Space Pope. The absence of a ceremonial buffoon argued against it, but his afro occupied enough of the screen to leave the question open.

Behind him stood the luxury and chaos of Colonel Fodder's office at Camp Ragnarok. Shelves of ancient weapons vanished into shadow. Golden artifacts filled glass cases. Part of a giant drill protruded through the ceiling. Green smoke rose behind a toppled statue while something shaped like a brain argued faintly off camera.

The scale, expense and audacity of the room gave the call immediate authority. Every lieutenant colonel was jealous of it. Therefore, whoever occupied it had to outrank them.

Bo held Ary's forged credentials close to the camera. “This is Major General B. Bovastein,” he muttered. He paused because he had expected the card to do something after he said it.

The CRT began its slow circuit around the table. Each officer received a private view of Bo's face, followed by a glimpse of the enormous office behind him. The motor groaned as it dragged the weight of the tube from one seat to the next.

Rchibald straightened his bathrobe.

Opinhopper removed her vacation goggles.

Mith covered the name embroidered on his robe with one hand.

“I have personally retaken Camp Ragnarok from the Saturnian invaders,” Bo announced.

The council murmured.

Bo moved to a giant map hanging on Fodder's wall. It depicted the Valhalla impact crater, the underground transport system and dozens of suspected artifact sites. Red dots covered the surface and continued into margins labeled UNKNOWN, PROBABLY CURSED and ASK PLUTON.

Bo picked up a long pointer.

Everyone in the council chamber became attentive. Officers trusted maps. They trusted red dots on maps more. A man holding a long stick beside many red dots was almost certainly telling the truth.

Bo pointed at one. “This is where we won.” He pointed at another. “This is where we won, twice.” He swept the pointer across the remaining dots. “And all this other stuff is ours now too.”

The lieutenant colonels chattered among themselves. Atton wanted to know whether the red dots represented Saturnian concentrations. Angworth thought they represented mineral claims. Mith announced that his grandfather had invented the red dot during an early carrier refit.

Bo struck the map loudly with his pointer. “Hey. I'm talking here. You listen to me.”

The chamber fell silent. That sounded exactly like a major general.

Bo returned to the camera. “As a result of my great victory, I'm ordering you to recall all troops and return to Jupiter. The war is over. We all won. Hooray.”

The screen continued rotating. The lieutenant colonels looked at one another over the enormous gap. That did NOT sound like a major general.

Iller leaned toward his microphone. “Who is this joker?”

Heeseman shook his head. “Never heard of him.”

“I have,” Opinhopper said.

Nine faces turned toward her.

Usan folded her hands calmly on the edge of the table. “I studied under Major General Bovastein at the Red Spot War College. Truly astonishing presentation and stage presence.” She had never attended the Red Spot War College. She had, however, learned during her interrupted vacation that an officer who recognized a surprise superior first could claim to

have been allied with him longest.

The other lieutenant colonels reconsidered Bo.

Ayewether raised one hand. “But if the war is over, who do we have left to fight?”

The room became uneasy. None of them looked forward to that scenario. Without an enemy there could be no campaigns, no activated units, no emergency budgets and no operational necessity for Jupiter-gravity hot tubs aboard a military carrier.

Rchibald was less troubled. He had been ready to pack up anyway. “All right,” he said. “Let's recall the troops for the time being. We'll regroup, get some rest and recreation, and then decide our next move.”

Heeseman frowned. “So we aren't going back to Jupiter?”

“Not yet.” Rchibald placed both knuckles on the table and leaned forward. “I've got a gut feeling we'll need to stick around for a while longer.”

Angworth nodded gravely. “To secure the peace?”

Rchibald considered the phrase. “No. To conquer the peace.”

The council approved immediately. Conquering sounded measurable. Peace did not. Ayewether asked whether captured peace qualified for prize money.

On the screen, Bo was still talking. “And double the troop rations,” he ordered. “The strawberry ones, not the toothpaste ones. Also everybody needs more training on how to tell friends from enemies. Maybe you could put different hats on them. And quit shooting villages.”

No one was listening to him anymore. The council had accepted the portion of his authority that justified what it already wanted to do. Everything after that was an unauthorized expansion of command.

The CRT rotated past Opinhopper. She gave Bo a tiny salute where the others could not see it.

Then the screen reached Rchibald again. He switched off the audio.

Bo continued speaking silently while the council debated how many medals each of them deserved for ending the war and who would command the campaign against the resulting peace.

After a while, Bo noticed no one was answering. He looked off screen toward Moe who had gone back to looting ancient gemstones. Bo

shrugged then hung up the phone. Major General B. Bovastein found his way back inside Bo's vest pocket.

CHAPTER SIXTY-SIX ANYWHERE BUT HERE - THE END

Camp Ragnarok was burning from the inside out.

Molten tungsten flowed through the hallways in branching white-orange streams. It poured from the ruined elevator shaft, crossed laboratory floors and followed the base's slight downhill grade toward the reactor galleries. Anything made of ice became steam. Anything made of metal became part of the river. Anything made of plastic became an odor no warning system had been programmed to describe.

The alarms had stopped trying to identify individual emergencies. They screamed continuously now.

Bo and Moe drove the giant digger laterally through what remained. The drill's spiral head chewed through walls, support columns, medical theaters and one corridor that curved away in both directions but still managed to be struck twice. Cutter heads tore cables from the ceilings. Agitators threw desks, surgical equipment and ancient artifacts behind them in a storm of expensive fragments.

Moe sat in the second control seat wearing a colonel's coat over his otherwise naked body. The coat was too small across his shoulders and far too long at the back. Three laboratory mice remained in one pocket. They had stopped trying to escape and now appeared to be assisting with navigation.

Bo wore his old combat suit and drove. Driving required him to hold one lever forward with his knee, pull another with both hands and kick the dashboard whenever the drill began moving in the direction it was pointed.

Moe had discovered the controls for the cutter speed. He pushed them all the way up.

The digger roared into Fodder's private museum and turned six centuries of military history into gravel. A bronze general vanished into the drill head. The machine coughed and fired his medals out through an exhaust vent.

“Left!” Moe shouted.

“Got it,” Bo said and pulled the wrong lever.

The digger rolled onto its side, crossed the ceiling and landed upright in the genetics wing.

Rows of empty cloning tanks burst beneath it. Amber fluid washed across the floor, met the tungsten and exploded into steam. The blast lifted the digger, rotated it half a turn and placed it gently into the cafeteria.

Bo stared through the cracked windshield. “See? I'm getting good at this.”

A loudspeaker crackled overhead. “Bo.” The voice belonged to Serj. It also belonged to Colonel Fodder. Bo knew that now.

The man speaking wore Serj's new body, Serj's neck scar and Serj's fatigues. The mind inside had spent sixty-five years learning how authority sounded when it wanted something. Pluton had moved Fodder out of one body and into another, then left the original colonel pounding against glass while the replacement walked free.

Whether any part of Serj remained in there was a question Bo no longer intended to ask.

“Bo, please stop,” Fodder said through the public-address system. “You have made your point.”

The digger crashed through the cafeteria freezer. Thousands of frozen desserts flew into the air. For several seconds the burning base experienced chocolate snow.

Moe caught a package and read it. “Strawberry.”

Bo held out one hand.

Moe slapped the package into it. Bo pushed it through his helmet's food port without slowing down. “A bit light on the fluoride,” Bo muttered.

“Bo!” Fodder shouted. The speakers amplified him until ceiling panels fell loose. “Your actions are irrational. Camp Ragnarok contains irreplaceable technology, genetic archives and the accumulated weapons research of generations. You are destroying the future of Jupiter.”

Moe threw a switch. The digger's rear excavator arm swung around and removed the cafeteria from the future of Jupiter.

“Can't hear you,” Bo yelled back.

The PA increased its volume. “You can hear me perfectly!”

A small radio mounted below the dashboard crackled at the same time. It was an old Citizens Band set with a coiled microphone cord, two tuning knobs and a handwritten label that said SURFACE TRUCKERS

ONLY. Someone had wedged a casino chip beneath it to keep it level.

Bo recognized a radio when he saw one. He picked up the microphone. “Breaker, breaker. This is Major General Bo. Come back.”

Static answered. Then Fodder's voice came through the little speaker, quieter and suddenly more personal. “Bo?”

“Yeah.”

“Thank goodness. We can discuss this like reasonable soldiers. First, stop the drill.”

Bo steered through a set of blast doors before they finished closing. The drill took both doors with it. “Remember when I said I wanted to get revenge on the people responsible for killing all my friends?” Bo asked.

There was a pause. “Yes.” Fodder's voice became gentle. “I remember. Your grief was understandable. Misguided, perhaps, but understandable.”

“Well, I realized that was foolish.”

The digger entered Laboratory Seventeen. Silent scientists crowded the four balcony levels, vigilant as ever. Several held two pencils and appeared uncertain which end of either device to point at Bo.

Moe aimed the drill head toward the pedestal chair. The great ring of surgical lights descended automatically, preparing to receive a patient while the room collapsed around it.

Fodder sounded relieved. “That's very wise, Bo. You are making great progress. Revenge reduces complex historical forces to the moral failings of individuals. No one person is responsible for a war.”

“That's what I figured.” Bo drove forward.

The probability-transfer chair disappeared into the cutters. Tubes and cables wrapped around the drill head until the entire machine glowed blue. Every screen in the room displayed Bo's skeleton, then Fodder's old face, then the words MISMATCH ERROR.

The scientists did not flee from the balconies. They continued to observe with complete objectivity even as they were pulled into the maelstrom and were ground into bits by the drill.

Bo kept the radio close to his helmet. “The entire system is to blame, not individuals.”

“Exactly,” Fodder said. “Now bring the digger to a controlled stop and

we can rebuild that system together.”

Bo nodded as though Fodder could see him. “So instead of revenging, I'm doing the next best thing.”

Fodder hesitated. “What would that be?”

Bo shoved every control forward. “Destroying this base. Yeehaw!”

The digger charged. It tore through Laboratory Seventeen, crossed the adjoining cloning chamber and shattered the cylinder containing Fodder's former body. Fluid flooded around the machine. The old body tumbled free, took one breath and immediately began shouting orders at the scientists fleeing past.

The public-address system shouted different orders in the same voice. Half the personnel obeyed the naked Fodder. Half obeyed the invisible one. The remaining half attempted to calculate how three halves had happened and were trampled by the first two.

Professor Pluton swept through the confusion on his hoverboard command chair. His giant blue glasses reflected fire from both directions. He carried six clipboards and was writing on all of them. “Remarkable!” he cried. “The subject has transferred catastrophic luck to the institution itself!”

A ceiling beam fell toward Bo.

It struck Pluton instead, flattening the hoverboard and launching the professor through an open medical hatch. The hatch closed behind him and displayed COMMENCING PROCEDURE.

Bo turned the digger toward the central reactor galleries.

Moe looked over. The white half of his face appeared worried. The black half looked delighted. For once both halves of his brain reached the same conclusion at the same time. “We probably don't want to be sitting here when you hit that.”

“Good point.”

They locked the controls forward, wedged the hammer against the accelerator and climbed out while the digger continued without them. It rolled down the sloping corridor toward the reactors, dragging a river of molten tungsten behind it.

Bo and Moe ran the other way.

The base had become a maze of fire, steam and contradictory evacuation

arrows. Bulkheads opened onto walls. Staircases folded themselves away. Extendable bridges crossed shafts and withdrew as soon as anyone trusted them.

Overhead, the PA system pleaded in Serj's voice. “Bo, come back! We can still make the deal! Ten million! Twenty million! I can make you a real general!”

Another speaker carried the naked Fodder's voice from somewhere below. “Disregard that impostor! I am Colonel Fodder! Arrest that impostor!”

Moe carried the plastic briefcase he had found behind Fodder's desk. It was packed with high-denomination Jupiterian script and casino chips from seventeen resorts, four of which had been destroyed decades earlier. He had no trousers, no shoes and no intention of leaving it behind.

Bo carried nothing except what he had already stolen and the weight of everyone who had not reached Camp Ragnarok with him.

They reached the central shaft. Molten tungsten fell through it in glowing ropes. The elevator car was gone. Pieces of the spitter's feed system tumbled past into the depths. Far below, the digger struck something important.

The impact silenced every alarm for one peaceful second. Then Camp Ragnarok began to implode.

The floor dropped beneath them. Air rushed downward. The reinforced ice spire groaned as hollow levels collapsed into one another around its central core.

Bo pulled two emergency jetpacks from a wall rack. One had no straps. The other had no left thruster.

He handed Moe the one without straps. While Moe was busy putting it on he grabbed a spare helmet he had strapped to his back. “Here, you’re gonna this where we’re going.”

Moe looked at it. “That’s Rbra’s. Where did you get it?”

“In one of Fodder’s drawers. Put it on.”

Moe took the helmet and put it on. There was no suit for it to connect with so it automatically entered emergency mode.

Bo looked up the shaft. “Hold on tight.”

“To what?”

Bo fired his own pack before answering. The good thruster launched him sideways. He bounced from the shaft wall and began climbing in a spiral. Moe clutched his jetpack against his chest with one arm and the briefcase with the other. Its exhaust scorched the tails off his stolen coat.

They shot upward through steam, falling debris and streams of molten metal. The shaft narrowed around them as the base crushed itself from below. Bo kicked away pieces of ladder. Moe struck an elevator counterweight and spun three times without releasing the money.

Fodder's voice followed them through the failing speakers. “Bo! You need me! You have nowhere else to go!”

Bo looked up. The hatch to the pinnacle was closing. He aimed for the shrinking gap. His damaged jetpack aimed somewhere else.

Moe reached out as he spun past, caught Bo by the boot and threw him upward. Bo struck the hatch shoulders first and wedged it open. Moe slammed into him a moment later.

Together they spilled onto the observation deck. Air continued to rush out of the wedged hatch and into the vacuum of the open platform.

The spitter had melted through most of its mounting. Its barrel pointed into the shaft, still firing occasional blobs of tungsten whenever a severed control cable touched the floor. The reinforced walls glowed red beneath their reflective coating. The entire pinnacle leaned three degrees toward Jupiter.

Bo and Moe crawled across the deck as the floor shifted under them.

Behind the elevator housing, the hopper still waited on its small landing pad. Its engines idled patiently. Its hatch remained open.

Moe stopped at the threshold and looked back at the collapsing spire. “You had this planned the whole time?”

Bo climbed into the pilot's seat. “Sure pal, whatever floats your boat.”

Moe threw the briefcase into the navigator's seat and climbed beside him. He pressed the close hatch button then turned the cabin pressurization dial all the way up.

The hopper controls were simpler than the digger's. That made Bo distrust them. He pressed the largest button. The hatch opened again letting all the air out. “Sorry about that.”

He tried another. This time the landing clamps released. The engines rose from an idle to a violent scream.

Camp Ragnarok folded into the ice beneath them. The spire's reinforced shell split lengthwise. Steam, molten tungsten, museum pieces and laboratory furniture erupted from the fracture. The pinnacle dropped away, carrying the landing pad with it.

The hopper remained suspended for half a second over the collapsing base.

Then Bo found the throttle and pressed it all the way forward. They shot into the Callistonian night.

Below them, red cracks spread through the ice around Camp Ragnarok. Above them, Jupiter filled the sky. The Arley Mith and the other carriers moved across it as small points of light, recalling their soldiers so they could prepare to conquer the peace.

Moe strapped himself into the copilot's seat. He placed the briefcase on his lap and held it with both arms.

Bo pulled back on the controls. The hopper climbed through the traffic lanes, ignored three demands to identify itself and passed between two descending military craft that had received the recall order at different times.

Callisto curved beneath them.

For the first time since Bo had arrived, nothing was shooting at him.

Moe looked through the forward glass at the stars. “Where are we going?”

Bo looked at Jupiter. He looked at the carriers. He looked toward the distant points of Ganymede and Io.

He thought about Granny's farm, Ary's grave, Rbra in the manager's office, Oan beneath the ice berm, Ricia across the gap, Lvis in the parking lot and Arles laughing while he pulled every pin.

Then he pushed the hopper beyond Callisto's orbit. “Anywhere but here.”

Moe nodded.

Behind them, Camp Ragnarok disappeared into its own crater.

Ahead of them was everything else.

THE END