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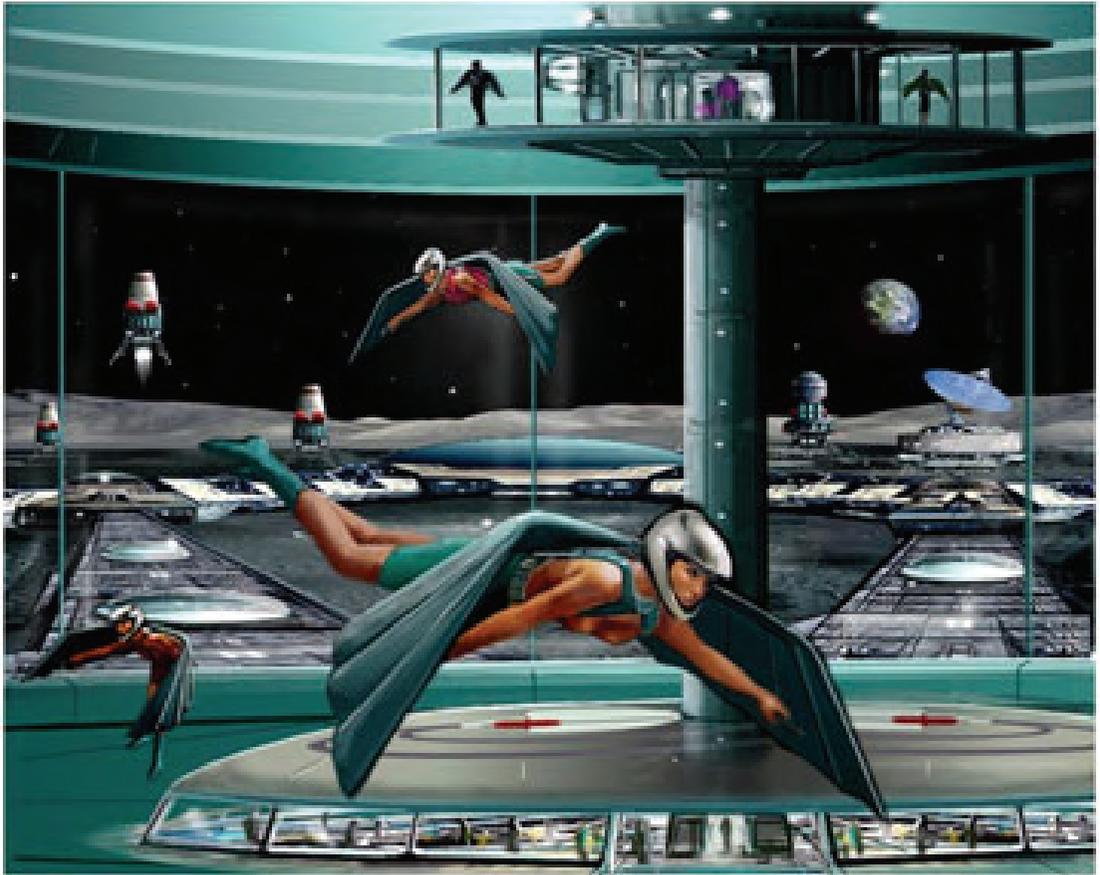
Moonbeams

Tales from the High Frontier

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Cover: The Witch Head Nebula taken by the Hubble. Courtesy of NASA

The space station and ship are courtesy of Bill Wright as is the picture below.



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Editors Note: This edition of Moonbeams, like that of previous editions, has stories that are not strictly moon related, but good enough to share with our readers. Other genre will be given consideration when there are no other submissions.



Moving Day

By Dorothy Diehl

The elevator stopped, but the door did not open. The small digital screen above the door that should have read “LL” was blank. I pushed the “Open Door” button on the control panel, but nothing happened.

“Push it again,” insisted Riana Henderson in an irritated voice. She was standing behind the horticultural containers that Hugh Mackel, my lab supervisor, had stashed inside the door of the elevator. Inside of them were vegetable seedlings, earthworms, composting microbes, bumblebees and two canaries. Behind and around Riana were boxes of kitchen utensils, dishes, food staples, bed linens, towels, a ten-liter bottle of drinking water, a portable aquarium of tropical fish, our footlockers, and my space suit.

“I did push it twice,” I replied. “Maybe we’re only part way down the shaft.” Wondering if the engineers had tested the elevator’s operation after they installed it two days ago, I pushed the “Down” button again. Nothing happened. “I guess we’d better return to the lunar surface,” I said, and pushed the “Up” button. That did not work either.

“Call for assistance,” Riana demanded in exasperation.

I activated the com screen. “This is Valerie Keeler calling the ops center from the new elevator. It’s stuck and won’t budge.”

The round face of Sven Hansen, the com officer on duty in the ops center, appeared on the screen. A shock of red hair stuck out beneath his uniform’s cap and his blue eyes were focused on his com screen. “I’ll contact engineering immediately,” he replied calmly.

Two minutes later, we were surprised to see the face of the commander of the lunar base, Director Fillmore, appear on the elevator's com screen. Riana was his administrative assistant. There was a perturbed look on his black face as he rubbed his left hand across his flat top haircut. "This is odd," he said. "The elevator worked well several times earlier today.

"Well, it's not working now," retorted Riana.

"Just sit tight," he assured us, "we'll have you down to the lower level in a few minutes."

The few minutes stretched into ten minutes. There was no room to move around in the elevator. No chairs either. Both of us had put in a full duty shift before Director Fillmore told us that we were to be the first to move down to the lower level into biospheric apartment 108. It was one of ten that had just been assembled in a sub-surface, large cavern formed by a lava tube running from the Apennine Mountains. The lunar base had been located close to it on purpose.

Riana had objected, "Can't we do that after our rest period?"

"No," he had said, "there isn't enough time to move some of the staff down there before the SS Hercules arrives with more people, supplies and equipment if we don't start right now."

"Why are they coming before we have a place ready to house them?" I had asked.

"Because making an energy efficient transit from Earth's orbital space to lunar orbit requires the orbital nodes to be lined up and that happens only twice a month," he had explained. "You just don't stroll out to the Moon whenever you feel like it. Plus, sealing and pressurizing the cavern around the apartments took longer than we had scheduled, and the SS Hercules was already underway."

We fidgeted from one foot to the other as we waited for the

elevator to start moving. When the com screen chimed softly and lit up again with Director Fillmore's face, he looked apologetic. "I'm sorry to inform you that fixing the elevator is going to take at least an hour," he said. "An engineering team has suited up and scrambled into the shaft to find the glitch."

"Do you mean to tell us that with all the sophisticated technology we have to operate the entire lunar base, they can't even run a damn elevator?" demanded Riana.

"It's always the unexpected that trips you up," he reminded us. "We'll contact you as soon as the elevator is working again." He turned off the com screen in the ops center.

I turned towards Riana. Her blonde hair was brushed back into a tight bun. Her hazel, hawk-like eyes dominated the fine features of her attractive face. She was trim and fit in her pale pink business suit skirt and jacket with a tailored white blouse. Around the base she was known as Miss Efficiency who knew the details of everyone's location, job assignment, duty schedules, and off-duty interests as well as the logistics of the base supplies and equipment. Living with twenty-nine other people in a network of a dozen space station-type cylinders buried under a meter of regolith on the surface of the Moon, she was an amazing personification of organization by the book. She did, however, have a sense of humor and enough empathy to correct the mistakes of others in a non-judgmental way. It had been three years since she had arrived with the first landing party to set up the original outpost.

Her current office, adjacent to the director's, had the only meter-wide glass porthole in the base. It was centered in the end of the cylinder with a view of the lunarscape and the landing pad paved with lunar concrete one hundred meters away. A ramada extended horizontally above that window from the top of the administrative cylinder as well as at a right angle over to the out-vac

storage hangar for the lunar rovers and construction equipment. Regolith was piled a meter deep on top of the ramada. Despite the ramada, you could look through that porthole and still see the lunar black sky. It was a popular spot for the base personnel to stop by momentarily, greet Riana, and look outside at our faraway homeworld, the Earth. Nothing ruffled her feathers until now. Being trapped in a stuck elevator after a full duty shift and before dinner had stretched her patience to the limit.

I looked at the conglomeration of stuff in the elevator. Standing up for an hour amid all that stuff was going to be mighty miserable. “Maybe I can stack the six horticultural containers on top of the packing cartons to give us some elbow room,” I suggested, and proceeded to do that.

“What we really need are two chairs and I could use a cup of tea,” she observed while I stacked the horticultural containers.

“But now, we can flip our footlockers horizontally against the side wall of the elevator,” I said. “They’re not comfortable, but we can sit on them.” We moved the footlockers and then I rummaged inside the carton of groceries for something ready to eat. “I doubt that I can make us any tea.”

“Scratch the tea,” she said. “There’s no toilet compartment in here.”

I fished out a jar of peanut butter, a jar of apricot jam, and a loaf of sliced bread from the grocery carton, and two table knives from the utensil carton. Riana cleared some space on top of the carton of bed linens to use as a table. “When all else fails, it’s PBJ sandwiches to the rescue,” she stated matter of factly.

“Here’s a bottle of apple cider,” I said. “Would you like some?”

“No, thank you,” she answered. “I’ll just have a few sips of water. It may be awhile before we can get out of here. Can you wait that long?”

“I think so,” I said. This was my first experience with a glitch in operations since my arrival four months ago. “If we have to pee, maybe we can use the urine collection device in my space suit,” I suggested.

“I hope to God we don’t have to resort to that,” she said. We sat down on the footlockers and as we munched our sandwiches, we talked about how I had been selected to join the lunar base team. My assignment came about as a last minute replacement for a horticulturist who had nearly completed the three-month lunar orientation-training program at White Sands Spaceport. Not many women space applicants were into gardening and not many horticultural specialists were willing to go away from the home biosphere into space. I was the only one available on short notice. I received a rushed, bare bones training program in three weeks before launch to Low Earth Orbit. My colleagues told me I was lucky to have been spared the demanding fitness regimen and the daily psychological interviews for three months.

The com screen chimed softly and lit up with Director Fillmore’s face. His forehead glistened with beads of sweat. “I see that the two of you have rearranged things to be able to sit down,” he said approvingly. “That’s good because things are not going well. A fail-safe mechanism stopped the elevator when the air sensors in the elevator shaft and the lower level cavern detected a drop in pressure. There’s a leak somewhere in the cavern that is also affecting the shaft.”

Riana and I glanced at each other with alarm. The cavern was about one hundred meters in length and sixty meters in width--about the size of a U.S. football field--with twenty-eight meters up to the three-meter thick ceiling of the lava tube, which extended back many kilometers farther beyond the cavern. A large wall with

an industrial-sized air lock had been constructed at the “front” end of the cavern where the lava tube sloped up to an opening in the lunar surface. Last week we had been informed that the entire cavern had been sealed for eventual pressurization.

“Tell me again why we were in such a rush to pressurize the cavern,” inquired Riana. “We knew the odds were high for leaks to develop, and the apartments, their passageways and the lower level elevator lobby were built to be pressurized and located in a vacuum. Why didn’t we do that first and save the air to pressurize the cavern at a later date?”

“Because Dr. Sheila Stone, our staff psychologist, insisted that we needed the expanded headroom of the cavern for the morale of the base personnel,” he explained. “Living in tin cans for three years begins to wear on people. Our construction people have the beams, trusses, and flooring ready to assemble the first lunar gym above the apartments. Some of us were hoping we could show the new arrivals on the SS Hercules how much fun it is to play lunar basketball. That’s not going to happen now. But, what is crucial is that both of you stay put. Whatever you do, do not try to force your way out of the elevator until we find and seal that leak in the cavern. The engineers are confident that the integrity of the elevator has not been compromised and that your air pressure will remain normal.”

“What happens if it doesn’t?” I asked anxiously.

He hesitated before answering me, “If you lose air pressure, it would be fatal. But, the odds of that happening are very low. Don’t think about it. Try to get some sleep.”

“We can only improvise one ‘couch’ on these footlockers,” Riana reminded him, “and there are two of us.”

“You’ll have to ‘hot rack’ it, like we do the sleep compartments in the base when a ship arrives with more people than we have bunks,” he replied. “Would you like me to pipe in some music for

you?”

“No, thanks,” said Riana, “at least, I prefer no music. How about you, Valerie?”

“Peace and quiet are fine with me,” I agreed.

“Call me immediately if you have any concerns,” he insisted. “You can always suit up if the worst happens, and the engineers can pry you out of the elevator.”

“I don’t have my space suit with me,” Riana informed him. “It’s in my office.”

“And all the biologics for the greenhouse module of the apartment are also at risk,” I reminded him. Vegetable plants, earthworms, bumblebees, tropical fish, and canaries might not seem important to other people at the lunar base, but they were essential in my opinion.

“Then you’d better check the air pressure sensor in the elevator often, and pray that the alarm doesn’t go off, and that the engineering team finds that air leak in the cavern soon,” he advised us. “Do your best to get some sleep. There’s not anything else you can do. Good night.” The com screen went blank.

“He expects us to sleep in these circumstances?” I asked Riana incredulously.

“Sleeping will make the time go faster for us while they find and fix that leak,” she reminded me. “However, that’s easier said than done on these footlockers. Talk about being uncomfortable.”

“There are pillows and blankets in the packing carton of bed linens,” I said. “Maybe we can fold up a thick quilt for a mattress.” We improvised a single “bed” on top of the footlockers.

“Should we flip a coin to decide who gets to sleep on it?” asked Riana.

“No, you sleep on it,” I replied. “I’ll put my bedding and pillow on the floor by the elevator doors. I’ll be fine. Besides that, I need

to check on the biologics every so often.”

“You never get upset about anything, do you?” she remarked.

“Getting upset is a waste of energy,” I replied, “and it doesn’t accomplish anything.”

“Some folks blow off steam to feel better,” she observed.

“Maybe that works for them, but not for me,” I assured her. “I’m going to focus on how great it will be, after a duty shift, to go to a three-person apartment with private bedrooms instead of a dorm with sleep compartments.”

I checked the air pressure sensor and its alarm on the control panel, dimmed the lights, took off my shoes, and lay down in my light gray jumpsuit on my makeshift bed. The last time I had slept on the floor was when I was in eighth grade and traveling cross-country by air with my mother. Our flight into Denver had been delayed by bad weather and we had missed our connecting flight to Seattle. We and a few hundred other people were on stand-by for departing flights. My mother and I had spent long days and short nights at a biology convention in Baltimore and we were exhausted. Even if not all the chairs in the waiting areas had been occupied, my mother would have still maneuvered us to an out-of-the way spot next to a wall and lay down on the floor. She used her purse for a pillow and I put my head on my backpack. We had slept for a couple of hours before finally boarding a flight for Seattle. Even here and now, the situation could be worse. Suppose the lights went out? Or, we lost the com link? Or, the breathable air ran out? In spite of such somber thoughts, my fatigue pushed me into sleep.

A few hours later, I woke up and scrambled quietly to my feet. I checked the air sensors. The pressure was still normal and the lithium canisters were operating normally. This indoor air, like that of the base above, was breathable. Riana sat up, swung her

stockinged legs and feet off the “bed”, and looked at her wristwatch. “That was a short night,” she said. “I’m still tired.” Her pale pink suit skirt and jacket were rumpled.

“Me, too,” I agreed and brightened the lights so that I could check the status sensors on the horticultural containers. The bumblebees were in a state of induced hibernation, which was still holding. The earthworms were crawling through the cool, moist, dark soil in their container. The composting microbes, in their warm, moist, dark soil mixed with shredded plant debris, had a normal gas exchange. When I uncovered the canaries’ cage, they tweeted and flew over to their water bottle and food tray, neither of which was empty. The air pump and heater were still running on battery power in the portable aquarium. When I turned on its light, the fish were swimming around as usual and seemed right at home. I turned off the aquarium light to conserve power. So far, so good, but how much longer would it last?

“I don’t suppose the engineers found that leak,” Riana remarked, “or they would have contacted us right away. I don’t know how much longer I can wait to get to a toilet.”

“Me either,” I said. “Let me rearrange things so we can get to my space suit.” I piled my bedding and pillow in the front corner of the elevator and in the lunar gravity easily shifted the packing cartons with the horticultural containers on top of them forward. I arranged a semi-private space in the back corner and invited Riana to use the urine collection device in my space suit first. After I also used it, we cleaned up with sanitizing wipes. I found some granola bars in the grocery carton for breakfast.

“Just one is enough for me,” said Riana. “I never thought I’d hope for some constipation to get through the day.”

After we ate, we sat next to each other on the footlockers and wondered what we could do to pass the time. “This is so

frustrating,” said Riana. “I have piles of work on the computer in my office because of the SS Hercules arriving in less than forty-eight hours. Where should the new arrivals bunk, and where should the cargo be stored? And here I am trapped in a stuck elevator. If only I had objected more strenuously when Director Fillmore told us we had to move our gear immediately down to oblivion and...”

“Oblivion?” I interrupted. “Why do you say that?”

“Because I think it would have been much more sensible to locate the new biospheric apartments on the lunar surface next to the base,” she declared. “They are built to withstand a vacuum environment. I didn’t pursue a dream of living in space to end up underground for half of my life.”

“But the cavern in the lava tube has a more moderate thermal range,” I reminded her, “plus maximum protection from meteor impacts, cosmic rays, and radiation storms caused by solar flares.”

“Those are good reasons to use it as an emergency shelter, a warehouse, and eventually an industrial site,” she agreed, “but when they are off duty, people should live where they have open sky. Where you can see the stars and the Earth.”

“Except you can hardly see stars in the lunar night sky from the base, especially when the Earth is in full phase because of all the earthshine,” I reminded her.

“But on the lunar surface, you can always see the Earth in each of its phases,” she said emphatically. “I don’t want that view taken away from me.”

“You can always have a live view of the Earth on any of the electronic windows in a biospheric apartment,” I said. “You can even go to bed and fall asleep watching the Earth gradually rotate and its clouds shift in your bedroom’s electronic window. You can’t do that in a lunar base sleep compartment.”

“But, it’s not a direct view through a glass window,” she insisted.

“Does that make a difference?” I asked.

“Yes, it does,” she replied. “The view on an electronic window can be live or recorded. How can you tell which it is?” I didn’t know how to respond to that. What difference would it make? “And being trapped here in this elevator is...is like being...pulled under water and running out of breath. I have to get back to the surface.”

“Do you feel claustrophobic in here?” I asked in an surprised voice.

“No, of course not,” she answered. “Everyone is tested for that in orientation training, and if you test positive, you’re washed out of the program and Earth-bound forever. This elevator is a perfectly comfortable space. And I know right now that the Earth is in the lunar sky, but unless I can see it, I feel trapped. Don’t ask me why; I just feel that way.”

I stared at her. Oh my God! She must have Earth Separation Anxiety and it’s never been discovered until now. The porthole window in her office with the Earth view--she must be dependent on that in order to function here on the Moon. I have to contact Dr. Stone and... I stood up. “Why don’t I contact the ops center and see if the engineering team has made any progress?” I suggested. She nodded her head in agreement. I moved towards the com screen and looked at my wristwatch. It was almost 2300 hours. Dr. Stone was probably asleep. As I activated the com screen, I suddenly realized that if I told the staff psychologist that Riana Henderson had ESA, it would probably be the end of her lunar career. Could I do that to her?

The screen lit up with Kevin O’Reilly’s mischievous face. He liked the graveyard shift in the ops center. “Fewer distractions to

interfere with thinking up little pranks I can do without getting into serious trouble,” he had told me over lunch not long after I had arrived. He was waiting for me to speak.

“Have they found the leak yet?” I asked.

“No, they haven’t,” he replied. “How are the two of you doing?”

I glanced at Riana before answering, “We’re still here.”

“I know that,” he said. “Are you going stir-crazy?”

“No,” I quickly assured him, “we’re bored, but coping reasonably well. Let us know the minute you have an ETA for us to get out of here.”

“Will do,” said Kevin. We both turned off our com screens.

I faced Riana and suggested, “I guess we’d better try to go back to sleep.”

“I can’t,” she said. “I feel like I’m...I’m drowning. I have to get back to the surface.” She started pacing back and forth by the footlockers.

What the hell am I going to do? I can’t call back to Kevin in the ops center. I told him we were coping reasonably well. Besides that, no one can do anything to get us out of here.

Riana started muttering as she paced. “I have to get out of here... I have to get out of here.”

I tried to reassure her, “We will get out of here eventually. We just have to be patient.” My voice lacked confidence. Shivers of panic raced from my brain to the rest of my body. If she becomes so desperate that she tries to force open the elevator door, what will I do? With an adrenaline rush, she might succeed in prying it open and the immediate loss of air pressure would kill us. My decision to protect her lunar career and keep her Earth Separation Anxiety a secret could cost us our lives. I looked rapidly at all the stuff around us for something I could use to whack the back of her head and knock her out if she bolted for the door. If I miss the back of her

head and she turns on me and fights in an adrenaline frenzy... The horticultural containers would be wrecked; the bumblebees aroused and reacting angrily to danger, stinging us over and over; the aquarium smashed with shards of broken glass under our stocking feet soaked with water; the canaries shrieking and swooping about us in alarm... And we, swinging our fists at each other, would still be trapped in the chaos and destruction...

I swallowed hard and concentrated on my breathing. Beads of sweat formed on Riana's forehead and she swung her arms as she paced faster and muttered louder and louder over and over, "I have to get out of here; I have to get out of here..."

I knew that I had to distract her and calm her down. But, how? Heat flashed across my face and I felt sweat oozing from it and on my hands. I needed a drink of water. Maybe Riana needed one too?

"I'm thirsty," I said in a loud voice. "How about you? Would you like something to drink?" She turned a haggard, sweaty face towards me and paused in her pacing, but said nothing. "Maybe I can mix some fruit flavors in the water," I suggested, and rapidly continued, "What sounds good—strawberry, orange, lime, lemonade? Or, maybe a hot drink would cool us down. I'd like a steaming cup of cocoa with tiny marshmallows in it." She stared at me like I was an alien from Neptune. I had to keep distracting her. "You'd probably like a double latte with cinnamon on the foam. Or, maybe you'd prefer something stronger, like a margarita?" She seemed transfixed, trying to comprehend what probably sounded like gibberish to her. "Did you ever go to Mexico?" I continued. "Two years ago, I visited the agave region in the state of Jalisco. That's where they make tequila. It's amazing that they can get something that good out of a desert plant that's related to onions and lilies. Most of us think deserts are barren and useless, but

Mother Nature always surprises us.”

Riana stood still and labored to make sense of my random flow of words. I had to keep talking. “Maybe you’d rather go to the ocean and walk on a sandy beach, instead of desert sand. The surf pounds on the shore, the sea gulls swoop down over our heads, squawking with shrill cries, the salt breeze fans our faces, and the Sun warms our skin and relaxes our muscles. Why don’t you lie down and let me massage your back?”

I reached out and helped her slip out of her pale pink suit jacket. Then I gently sat her down on the “bed” on the footlockers and knelt beside them as she lay down on her right side, swinging her legs up on the quilt mattress and slowly shifted onto her stomach with her face pressed sideways on the pillow. Quickly I started talking again as I gently rubbed on the white blouse over the tight muscles across her shoulder blades. “Let me tell you about my childhood trips to the beach with my brothers.” I droned on and on as hypnotically as I could, and miraculously within an hour, Riana fell sound asleep. I was exhausted. I crawled over to the quilt and blanket piled in the corner by the elevator door and sitting there leaned against my pillow propped against the wall. I covered myself with the fuzzy yellow blanket and tried to rest my head on the pillow. It was not comfortable, but I dozed off anyhow.

I awoke with a start to find that I had slid down into a curled fetal position on the floor. I looked at my wristwatch. I had slept for five hours. My back hurt and I was still trapped in an elevator. At least today, I would not have to spend the required daily hour pedaling the high resistance stationary bike in the fitness center to maintain bone and muscle tone. Even the people, who insisted that they were here on the Moon to stay for the rest of their lives, still had to ride the torture bike one hour out of every twenty-four hour

period. You never knew when you might be summoned back to Earth, and heaven help you if you couldn't stand up in Earth gravity.

Anxiously, I glanced towards Riana. She had rolled back on her right side, but was still asleep and breathing easily. I relaxed and hoped that she would stay asleep until the engineering team rescued us. If only Director Fillmore had told me to move my stuff by myself down to biospheric apartment 108, I wouldn't be in this difficult situation with Riana. I had a reputation for being a loner because I felt most at home in the horticultural lab. Outside of it, I just complied with everyone else in the base and with whatever was going on. I could deal with being stuck here in this elevator, if I were by myself.

My arms and legs were stiff. Very quietly, I stood up and stretched. I was hungry, but decided not to risk waking Riana by poking around in the grocery carton. Carefully, I checked the status sensors for the horticultural containers. The bumblebees were still hibernating; the earthworms and composting microbes were okay. The aquarium air pump was still humming and the tropical fish were probably hungry, but I decided they could wait a while longer for food. I kept the canaries' cage covered. Then I realized I had not checked the vegetable seedlings since my duty shift yesterday in the lab. I moved my bedding away from the floor by the elevator door, and lifted the first container of seedlings from on top of the carton of kitchen utensils. I turned it around as I set it on the floor so that the open lid would shield the glow from the full spectrum agri-grow lights inside the container. Under the lights were geoponic trays of ten-centimeter high tomato plants. I smiled at them and checked the moisture sensor, which registered an adequate level. If we had to stay in the elevator for several more hours, I would have to give them some of our distilled drinking

water. The plants would not mind the tasteless water like the humans in the lunar base did. Potable water was a product of the fuel cells that provided the base with electricity during the lunar night span, and everyone complained about drinking it. But, not the plants. I glanced at Riana, who seemed to be waking up. I sighed. It was so much easier to deal with plants than people.

“What’s that smell?” she asked, wrinkling her nose.

“Smell?” I remarked. “Oh, that smell. It’s from the green foliage of the tomato plants. They smell like ripe tomatoes, even though they are still a long way from even blooming.”

Riana stood up and came close to the open container. “Such small plants must yield tiny tomatoes,” she said.

I chuckled. “They won’t set on fruit until they are much bigger. I have to transplant them into the large geponic trays in the greenhouse modules of the apartments. By the time they are a meter tall with mature fruit, they’ll be loaded with big, scrumptious beefsteak tomatoes.”

“How many seeds does it take to get a meter tall plant?” she asked.

“Just one seed,” I replied. “One seed about as tall as the cursor on your computer screen, and when it grows into a mature plant, it will produce over one hundred softball-sized tomatoes over the length of the growing season. Isn’t that amazing? No more freeze-dried casseroles with tomato sauce up ported from Earth to here.” At once I wished I had not made the last remark with the word “Earth”; I did not want to set Riana off with another bout of Earth Separation Anxiety.

“May I touch them?” she asked.

“If you want to,” I replied.

She lightly brushed the fingers of her left hand against the leaves, leaned over closely to the plants, and inhaled deeply. “It’s

like touching a tiny piece of the living Earth,” she said.

“That’s the whole point of biospheric apartments,” I reminded her. “You finish your duty shift and head for your apartment. As you open the bulkhead door and step inside, you breathe cool, moist, outdoor country fresh air blown into the apartment from the greenhouse module. You close the door and leave the chemically purified dry air of the lunar base in the passageway. You stop in the kitchenette for a glass of chilled water that tastes like Rocky Mountain spring water because it’s distilled water that’s been filtered through the right minerals. The cube-shaped apartment—four meters by four meters by four meters—is compact like two doublewide motor homes Earthside, stacked one on top of the other. You take the personal lift upstairs and walk past the tropical fish aquarium that serves as a nightlight in the mezzanine hallway to your small, but private bedroom. It is equipped with a personal, digital entertainment center, a multi-positioning bed, and an electronic window with live views of the Moon’s surface or recorded videos of your favorite views from back home. You take off your work clothes, put on your bathrobe and go downstairs for a hot shower massage in the bathroom or you can go to the bathtub room in the greenhouse module, which has the same dimensions as the apartment, for a relaxing bubble bath. Afterwards, dressed in loungewear, you and your two roommates make your own dinner with fresh produce for a garden salad and side dishes. You enjoy your relaxed meal with a glass of wine by candlelight in the dining room looking at scenery on a wall-sized electronic window. It’s like being transported back to Earth for your off-duty hours and sleep period.”

“That’s some sales speech,” remarked Riana.

“It’s guaranteed to be true,” I insisted.

“It hadn’t occurred to me that if you can smell and feel the

Earth, you wouldn't have to see it directly to feel connected to it." She looked me in the eye and said; "Thank you for helping me when I...I felt like I was drowning. That was the most awful feeling I've ever had. I nearly went out of my mind."

"And how do you feel now?" I asked anxiously.

"I can breathe again," she assured me.

"Good!" I exclaimed, "am I ever glad to hear that." As I closed the lid of the container, I was more than grateful to the humble tomato plants for curing her Earth Separation Anxiety that had nearly threatened our lives.

We found some crackers, cheese spread, and canned applesauce in the grocery carton. While we were sitting on the "bed" and eating our snack, the com screen chimed softly and lit up with Director Fillmore's happy face. "I have good news," he said. "Although we didn't find the air leak in the cavern, the engineers decided three hours ago that it was more prudent to conserve the cavern air, and they depressurized the cavern. The elevator lobby, the passageways, and the apartments are still sealed and maintaining normal pressure. I'm sorry that you were caught in this miserable ordeal, but it's over now. Go ahead and push the 'Down' button."

Riana pushed it immediately and the elevator descended to the lower level as we heartily cheered. The door opened. We were surprised to see Dr. Sheila Stone standing in the lobby. She greeted us as we stepped out of the elevator. Then she asked, "How are you feeling?"

"Relieved," said Riana and I agreed with her. Riana continued, "and a little tired and hungry and in need of a bathroom." She looked at her wristwatch. "Give us two hours to exercise, clean up and eat, and we can go to work."

"Before you do that," said Dr. Stone, "I must tell you that there never was an air leak in the cavern that affected the elevator shaft

and activated the fail-safe mechanism on the elevator. The cavern has never been pressurized. The seals in the elevator shaft were always intact. The entire experience was set up to test you, Valerie, on how you would react to a life-threatening situation.”

Riana exploded, “You deliberately made us think we could die from depressurization if we forced our way out of the elevator?”

“It was absolutely necessary,” insisted Dr. Stone. “Why...why did I have to be tested?” I stammered.

“In your minimal training program at White Sands Spaceport, the staff psychologists did not have time to evaluate adequately how you would react in a crisis,” she replied. “Observing you here did not tell us if you had the necessary team loyalty for mutual survival. You always seemed to be non-committal and easy going. Because no individual survives alone in space, we had to know how you would react before an actual crisis happened.”

“You could have let me in on this scheme of yours,” insisted Riana.

“No, we couldn’t do that,” said the doctor. “We had to keep both of you in the dark or the test would have been invalidated. Selecting an uninformed partner for you, Valerie, was difficult. Director Fillmore insisted that I choose you, Riana, because your emotional stability is like the Rock of Gibraltar. I was concerned that you would take charge of the situation and Valerie would just go along with whatever you decided. That would ruin the test.”

Riana and I looked at each other. She had a quizzical look on her face. Are you going to tell Dr. Stone what really happened in the elevator? I faced the psychologist, “So, did I pass the test?”

“That depends on Riana’s evaluation,” she said.

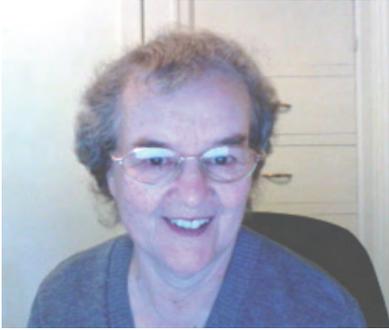
“Yes,” Riana stated emphatically, “she passed it with flying colors.”

I smiled at her. The thought that I could reveal her former

secret malady—the Earth Separation Anxiety—whenever I wished and thereby manipulate her behavior flitted briefly through my mind before I utterly rejected it. I was not that kind of person. Besides that, if I told the staff psychologist what had really happened, and Riana denied it, would Dr. Stone believe me? Riana could save her career and I could lose mine. As I turned back towards the elevator to pick up the horticultural container of tomato plants, I whispered in Riana’s ear, “Dr. Stone doesn’t need to know everything. Your secret is safe with me.”

Team loyalty, indeed.

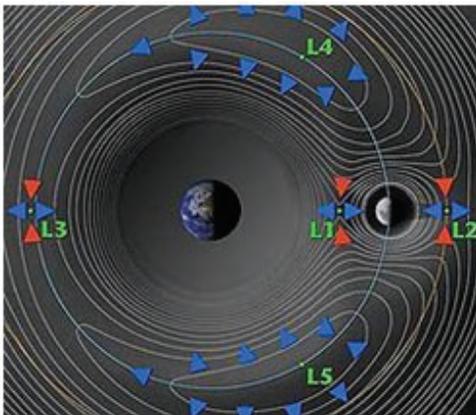
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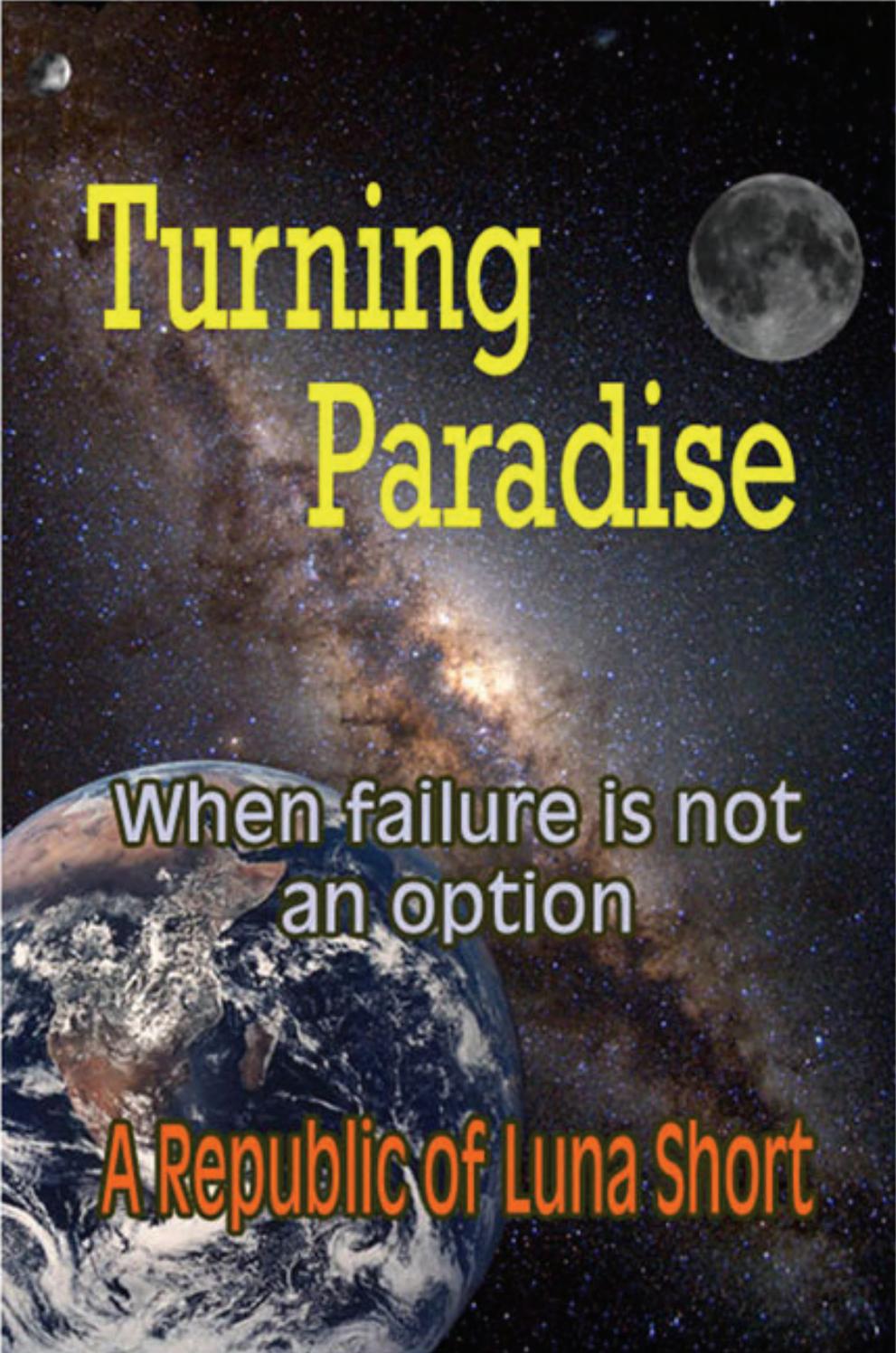
Dorothy is a retired planetarium teacher living in a small town in the Willamette Valley of Western Oregon. After almost forty years of happy marriage, she is now a widowed grandmother with a wonderful family, most of whom live nearby. Besides keeping up with

family and friends, she still maintains her home complete with a large yard and vegetable garden.

She also keeps up with the latest space and astronomy news. Dorothy is a long-time member of the Oregon L-5 Society, which is a chapter of the National Space Society. She joined its predecessor organization, the L-5 Society, in 1979 and wrote articles for their magazine. She thinks that the chances now of



becoming a space tourist are about zero but she is still enthusiastic. The next best way for her to visit space is by writing science fiction. Dorothy hopes you have enjoyed her story.



Turning Paradise

When failure is not
an option

A Republic of Luna Short

Turning Paradise

By Charles Lee Leshner

"WE MUST DELIGHT IN EACH OTHER, MAKE EACH OTHER'S CONDITIONS OUR OWN, REJOICE TOGETHER, MOURN TOGETHER, LABOR AND SUFFER TOGETHER, ALWAYS HAVING BEFORE OUR EYES OUR COMMISSION AND COMMUNITY AS MEMBERS OF THE SAME BODY."

JOHN WINTHROP (1757-1820)

PURITAN AND FIRST GOVERNOR OF THE MASSACHUSETTS BAY COLONY

Aldrin Station, Alphonsus Crater, Luna – March 19, 2036

The stage is bare except for two metal folding chairs and a stark podium, not much more than a metal pipe with some sheet metal welded to it. In one chair sits a middle-aged bureaucrat in a black suit and red tie. In the other is a slim young woman looking nervously out at the gathering crowd. She has tied her long dark hair into a ponytail. Luna's gravity makes it feel strange.

With Founders Day less than two weeks away, Deputy Director Goldsmith has better things to do than introduce the latest PhD to arrive in Aldrin Station. Normally he enjoys this part of his job, getting to know the colonists as they arrive. He takes great pride in being the official welcoming committee but on April 1 the city will celebrate its twelfth birthday and it's his job to pull together Founders Mardi Gras along Central Commonway. He doesn't have time for this.

Goldsmith reacts impatiently to someone online, oblivious to the young woman sitting next to him or the people filing into the

auditorium. In a matter of minutes, there are over a hundred and they continue to pour in. Many of them are students attending the University of Luna but there are a significant number of single men in the mix, a reflection on today's speaker. The babble is brisk, filled with testosterone and bravado. They all have a nice long look at the young woman on stage.

Martha Taranto feels their eyes upon her and sweeps her gaze over the crowd defiantly. She recognizes a few of the men from her research. For many months, she studied the mountain of material available within public records on the people and places that make up Aldrin Station. She learned a lot about this place long before setting foot in it but right now, she's looking for someone special.

Her eyes scan the sea of upturned faces. She's never met Bill in person but after spending hundreds of hours online with him, she's sure she will recognize him. That shouldn't have been a problem but Martha arrived three days early and caught Bill on a jobsite many kilometers away. They had wanted to meet for the first time at the spaceport but life is not always predictable. When you're colonizing a new planet, one must adapt.

She and Bill had talked briefly just before Martha took the stage. Bill assured her that he was close and would get there shortly so she pays particular attention to the big double doors at the rear of the auditorium. The incoming stream of people is slowing significantly, leaving many empty seats.

Martha is still looking for Bill when Goldsmith abruptly ends his online conversation, turns to her, and growls, "Let's get started."

The director stands and walks to the podium. A hush settles over the auditorium. One last figure enters and remains standing in the back.

It's Bill!

Martha stares at him across the distance and he stares back.

Not the most romantic start to a relationship. Bill smiles and gives her a little wave. Martha smiles and waves back, tension evaporating. She hadn't realized how anxious she had become.

Nearly everyone in the auditorium turns and looks at Bill. The tall young man smiles broadly and blows Martha a kiss. When in doubt, apply a heavy dose of boldness tempered with a dash of humility.

Goldsmith looks at Martha and then turns conspiratorially back to the largely male crowd. "My! My! My! It's good to see so many young men interested in astronomy!" The crowd laughs, "I will get right to it. As you know, the Deep Space Grid is being constructed to see further into space than ever before. With it, we should be able to see the remnants of the Big Bang! We may even catch a glimpse of the Singularity itself!"

The auditorium listens politely but most are looking past the director at the young woman. Martha hasn't taken her eyes off Bill since he walked in. At two-hundred centimeters standing, he's hard to miss.

Goldsmith reads off his handheld, "Four of the sixteen Grid telescopes are to be built within sixty kilometers of Aldrin Station which makes us a major part of the project. Bill Rogers... that's Bill in the back... Bill will assemble the camp modules, organize the construction crews, and work closely with today's speaker..." more laughter as he makes a display of looking over his shoulder at Martha and back at Bill.

Bill flashes the director his million-dollar smile. After Martha specifically requested him to oversee the construction phase of her project, he had rummaged through her public profile. He liked what he found, an intelligent young lady with a bright future, a woman who knew what she wanted and went after it. It was clear from the beginning that Martha had more on her mind than just astronomy.

A few short weeks later, while the project was still in infancy and while living on separate astronomical bodies, Martha proposed to him. Single, well liked, and ruggedly handsome, Bill is one of Aldrin Station's most eligible bachelors. It totally surprised everyone when he accepted. Now, after months of careful planning, Martha's arrival on Luna three days early caught him out on the surface laying maglev track and preventing him from meeting her at the spaceport. It was just one of those things. He didn't let it ruin his day.

Goldsmith works the crowd with the skill of a standup comic. "Now for something completely different... Most people think that the moon has perpetually clear skies but I'm here to tell you, you're *wrong!* Please welcome our newest colonist and Bill's latest squeeze, she's a professor from Cornell University, Dr. Martha *Taranto!*" the director sweeps his arm in the direction of the young woman with a flourish.

Stepping to the podium amid wild cheering and clapping, Martha looks out at the gathering. "Thank you Director for that wonderful... and unexpected introduction... thank you all for coming..." she waits for the laughter to fade, "I want to make one correction. I'm Bill's last squeeze, not just his latest!" More laughter and even some catcalls. Martha again waits for it to die down. "As an astronomer, I'm always looking for clear skies, but the viewing here on the moon is not as clear as you might think. The Apollo astronauts were surprised to see a bright haze and rays right before sunrise as they orbited the moon over a half century ago. They recorded their observations in a rough sketch."



Behind her, as she spoke, a large projection screen shows grainy

videos of Apollo 11 and the other early moon missions, ending with the sketch.

“You are all well aware that moon dust is a major problem. It’s worse than asbestos or coal dust when inhaled. Many of the people in this room have helped perfect devices and techniques that allow us to keep the dust at bay. But every lunar morning, after two weeks of frigid night, just as the sun peeks over the horizon, a strange phenomenon stirs the dust in a global storm that stretches from pole to pole.” A low chuckle rolls through the gathering.

Martha pours a glass of water from a carafe stored in the pedestal. It takes much longer to fill the glass, something only a shortimer would notice. She sips, glancing over the rim at Bill, intensely aware of the carpet of faces between them. What a strangely exciting day this is turning out to be!

“Mian Abbas studied moon dust for NASA back at the turn of the century. In 2005, he concluded that ultraviolet light combined with a radical increase in temperature caused moon dust to become electrically charged. The moons weak magnetic field is strong enough to repel the charged particles causing them to swirl high above the surface. The lighter they are, the higher they go. The smallest particles, 1 or 2 microns in size, are propelled upwards for hundreds of kilometers and can stay suspended for eons.”

“A lunar storm begins when the first photon energizes a tiny particle driving it upward. As the terminator sweeps across the land, more and more particles leap skyward in a long skinny dust storm. After sunrise, things rapidly calm down but many of the lower-mass particles remain suspended, some for hours, some for years. The process is relentless, like a clock sweeping out the seconds, day after day, year after year, the motion of the sun and moon has stirred and sifted the dust for over four billion years.”

“And at night the solar wind swirls around to the dark side and

bombards the moon with electrons, recharging the dust grains and keeping them suspended. We think that some particles have remained suspended for millions of years. Needless to say, the particles are a constant challenge to astronomers and something the Deep Space Grid must account for.”

“Observation problems are not new to astronomers, be it clouds, passing aircraft, or smog, we have learned to deal with it. As always, the key to solving any problem is in understanding the cause.”

“I will be overseeing the installation of four Keck Class 10-meter telescopes. The first will go on top of a crater about ten kilometers west of Aldrin Station. The machinery to cast and grind the mirrors will arrive later this month and some of you may operate it. Others will help at the construction site. The entire community will benefit from the project for years to come... That’s all I have. Are there any questions?”

To her surprise, dozens of arms shoot upward. She points to a man in the front row frantically waving, “Director, are these telescopes going to look for meteors heading our way?”

“Another truck was hit this morning. What are you doing about it, Goldsmith?” the man next to him asks, tension straining his voice. The auditorium rumbles in agreement.

Martha turns to look at the director. As an astronomer, she is well aware of the dangers posed by meteors but that is not the issue here. This is more resource management, something that will take time for her to understand here on Luna.

Director Goldsmith steps up beside her. “Folks, calm down. This is not the time or place.” He turns to her, “Aldrin Station has been working on meteor defenses for years and we’ve just completed the second enhanced cannon emplacement.” He turns back to the crowd, “We’re safer than we’ve ever been. Is it perfect?”

No... but it's better."

"Sorry director, we've heard that before," the man in the front row responds.

"I know Doug, but this time it's true. The sensors on the new laser can track something the size of a baseball at 10,000 kilometers," Director Goldsmith turns back to Martha, sensing that she still doesn't understand. "Your dust notwithstanding, there is nothing between us and the hundreds of thousands of micrometeorites that pummel the surface every day. We've had two serious incidents just this past month and it is only a matter of time before someone dies. We are constantly improving our laser defenses."

Doug adds from the audience, "And your project, as important as it is, takes workers and resources away from that goal."

"I see," Martha says. "Let me assure you, I will do everything within my power to see to it that the Grid projects do not impact your schedule."

That earns sporadic applause and some words of encouragement. From somewhere to her right, a voice calls out, "We'll hold you to that!" The meeting lasts a few more minutes before adjourning.

As the auditorium empties, Bill moves up the aisle towards Martha. "Nice talk," he says pleasantly. He's a handsome devil and knows it. "I especially liked the way you captured the crowd. You had them eating from your hand," he smiles. His smile is never far and he flashes it early and often.

"That was a meat market and I was the meat! I thought that matching with you early would cut down on all the attention," Martha returns his smile. Bill's easygoing demeanor is one of the things that attract her.

Bill laughs, "Oh, it did! I have seen this auditorium packed,

standing room only.”

“Men are such animals!” Martha says with feigned disgust.

Bill laughs louder, “Wait ‘till the next single guy comes along and watch the ladies pack it in! The guys are mild, you girls are wild!”

“Really?” Martha says with fake surprise.

“Yes, really,” Bill says and motions for a young woman loitering nearby to join them. She’s not there by accident.

“Cheryl, have you met Doctor Martha Taranto?”

“Not yet,” Cheryl says coldly looking Martha over.

Raising an eyebrow in warning, Bill says, “Martha, this is Cheryl Tierce, our Quartermaster.”

“Very pleased to meet you,” Martha says offering her hand.

“Likewise, I’m sure,” Cheryl replies touching hands briefly. She would rather touch a spider. “I have a couple of custom servers that are marked for you. You can come by any time and pick them up.” She’s trying to be friendly but only partially succeeding. She wanted to see for herself the bimbo Bill dumped her for, now she wishes she hadn’t. Martha is stunningly beautiful.

Martha senses tension. Something more is going on. “Good. I was wondering when they would catch up,” she says. “Where exactly is your office?”

“Use your handheld to find the *warehouse*,” Cheryl says emphasizing warehouse. She works for a living and her office is in the cab of a forklift. “Or get lover boy here to show you where it is.”

The way she says it confirms Martha’s suspicions. These two share some history. Glancing at Bill, he stares back but remains quiet.

“Thanks Cheryl, I will find it,” Martha says.

“Suit yourself,” Cheryl turns abruptly and leaves, crossing the auditorium stiffly, never once looking back.

“What was that about?” Martha asks.

Bill looks intently at her, “You really don’t know?”

Martha frowns and shakes her head, “I can imagine... but your public profile said you were single.”

“Single, yes... celibate, no,” Bill responds with a grin.

“I see. Perhaps we should keep our relationship on a professional level,” Martha says with a sinking feeling in the pit of her stomach. Everything about Bill had felt right, until now. “Was I the cause of your breakup?”

Bill shakes his head, “To breakup there must first be a union. Cheryl and I were always just friends with benefits. I didn’t even know it ran deeper until you came along,” he says flashing that wonderful smile.

Relief floods Martha but she doesn’t let it show. “Well then, should we get down to business?” she asks.

“Sure... I have reserved a rover for this afternoon. We can go out to the first location and map it. The camp module is almost finished. Come by my shop after our ride or in the morning and I will give you the grand tour.” Bill likes the way her hair pulls back from her face and falls down her back. Not many have long hair on Luna. It’s just too big a pain to take care of.

Picking up Martha’s handheld, Bill quickly programs the unit to navigate to Stephen Hawking Spaceport. “The rover is at Hawking Spaceport. Be there in an hour. I’ve got some things I need to take care of so I will meet you there,” Bill smiles.

Martha sits quietly for a moment deciding if she is being taken for granted or if this was just according to plan. They had both agreed to start slow. They haven’t even touched yet. “Fine,” she says. She had already found her way around Aldrin Station. She should be able to find her way back to the spaceport.

Bill walks away whistling a little ditty that Martha doesn’t

recognize. He's happy and that makes her happy. How can a man have such a tight little ass and such broad shoulders?

Bill guides the rover up the sloping side of a small crater west of Aldrin Station. Martha sits beside him. Having arrived on the moon just hours before, this is her first time in a lunar rover and first time under the broad canopy of stars. If she leans forward and looks up, she can see the edge of Earth hanging almost directly overhead.

"This is incredibly beautiful. Thanks for bringing me out here," Martha says as they reach the edge of the crater and pull to a stop. "I owe you one."

"Now Martha, you don't owe me anything. Happy to do it. Besides, I wanted to get the lay of the land before delivering the camp module and this is a good way for us to break the ice," Bill replies.

"Yes, I suppose it is. Does this crater have a real name, something a little more glamorous than 415A?" Martha asks.

"Not that I know of. What would you like to name it?" Bill looks over curiously.

Startled, Martha says, "Oh, I don't know, maybe after my dad. He died when I was a kid."

"Sorry to hear that. What was his name?"

"Robert Cormac Taranto"

"Robert Crater?" Bill says and cocks his head listening to how it sounds. "Cormac Crater... I like that! Cormac Crater it is!" He grins at Martha. "What's the spelling?"

"C. O. R. M. A. C... It's that simple? We can name it anything we want?" Martha asks.

"Yes, it really is that simple. What did you expect, a government panel or something?"

“Yes, actually.”

“Enter it into the system...” his hands dance over the keyboard, “and submit the name for final approval,” he hits the enter key smartly, “but these things never get disproved. We had some British guy last year name a rill **Old Nuns Twat** from a line in a 1660 satirical poem, *Vanity of Vanities. They talked of his having a Cardinals Hat; They'd send him as soon an Old Nuns Twat.*”

“You’re making that up!” Martha says with a grin.

Bill crosses himself Catholic style and says in a terrible attempt at Irish brogue, “I swear on me mother’s grave, tis the honest truth.”

Martha smiles broadly and says, “That’s god-awful! What are you, a pirate?” Bill laughs with her. “The view from the summit of Cormac Crater must be stunning from outside. Can we go out and look around?” Martha asks.

“Sure, but first we run through our suits check list. I do yours, and then you do mine.”

“Deal!”

Martha is first through the door and down on the surface. She can hardly believe it! Beneath her boots lay regolith never before disturbed by any human. This is why she came here, to be the first, to walk where no one has walked before!

Shuffling around the rover, her breath catches in her throat. Gazing back the way they had come, Martha exclaims, “I knew it! The view is fabulous! And Aldrin Station looks so close.”

“It’s about ten kilometers,” Bill says. He stands quietly beside her for a few minutes, letting Martha take in the stark beauty of the lunar landscape.

“I hate to interrupt but we do have work to do. What say we get started by taking the topography of the crater?”

“That would be fine,” Martha says turning away reluctantly.

From the control panel at the rear of the rover, Bill inputs the coordinates and steps back. The electromagnetic rail gun mounted on top of the rover silently elevates and rotates until it's pointing across the crater. The heavy vehicle lurches under the force of the launch and the projectile streaks over the crater disappearing beyond the far rim almost two kilometers distant.

Walking back to the control panel, Bill soon has an image on the monitor.

Martha moves up behind him and watches over his shoulder. Elevation lines curve across the screen in full color creating a three dimensional grid of the crater and the surrounding terrain. Linked in with the Lunar GPS, the data details the topography to a few centimeters accuracy. Bill rotates the image making its true shape jump out of the screen.

Martha is impressed and remarks, “You guys have some great tools.”

Bill laughs, “Yes, and we know how to use them!”

Martha frowns and looks curiously at him. Realizing how he had interpreted what she had said, her face turns beat red. “I meant your equipment!”

Bill howls louder.

“Mr. Rogers!” Martha turns away in irritation.

Regaining partial control, Bill points to a section along the east side of the rim, “This is where the main pedestal will go. It needs bedrock, and the excavation for the camp module is over there. It's far enough away to isolate human-caused vibrations,” he grins.

Ignoring his smirk, “That's fine Mr. Rogers. Let's get started.” Martha says tersely and heads for the rover, her face still a deep shade of red.

“Oh now, Martha, don't be like that. I didn't mean nothin'.” Bill

says watching her stalk away.

“Yes, Mr. Rogers, I’m sure you didn’t! Perhaps I will put it in my report that *you didn’t mean nothin!* I’m sure my colleagues back at Cornell will be quite interested in what you mean and don’t mean!”

“No need to go to all that trouble for me, really.” Bill says, quickly stowing the launcher and securing the panel.

“If sex is all you have on your mind then do not talk to me,” she coldly replies. She finds it extremely annoying that she can’t just walk away from an argument. The suits communications make that impossible.

“Hey, get it through your head. I’m going to talk to you. We are on a mission on the surface of the moon, for crying out loud. Get over yourself!” Bill knew immediately, he should not have said that last thing.

Back in the rover, Bill must have apologized ten times with no effect. He finally gives up trying to get past the incident. Time passes in terse silence broken only when necessary. If their fledgling relationship is so easily damaged, maybe it’s best they end it now. The thought depresses Bill until he catches her discreetly watching him. She’s doing the same thing he is, agitating to see what happens. He smiles in relief. It’s a game he understands.

Over the next hour, Bill avoids all contact with Martha as they finish collecting the data needed by the construction crew. Finally, they turn towards home. As Bill guides the rover down the side of the crater, he suddenly guns it.

“Slow down!” Martha orders to no avail, gripping the arms of her seat hard.

“Out here you must trust the one you’re with,” Bill replies.

He swerves to avoid a rocky outcrop and feels the wheels come off the surface as they crest a mini ridge. Coming down hard, they

careen down the side of Cormac Crater seemingly on the edge of catastrophe.

As the rover plunges downward, Martha repeats frantically, “Mr. Rogers! Please slow down!” Her eyes are round pools of fear watching the terrain flash by, her face flush with excitement.

The rover bounces hard. Martha squeals and Bill laughs. A few moments later, they are off the mountain and on flat terrain.

“See, wasn’t that fun! You can’t find a ride like that in Disneyland!” Bill says smiling ear to ear.

“You really are a juvenile, Mr. Rogers!” Martha says drawn to him like a moth to flame in spite of his actions.

“Can we drop the Mr. Rogers crap? That was my father’s name. My name is Bill.”

“Whatever...” She can’t let him off the hook too easily.

“Darlin’, that was a lesson in trust. Either you do or you don’t. Which is it?”

“Seriously? How is killing me the very day I arrive building trust?” Martha asks indignantly.

“You were never in any danger,” Bill responds.

Martha looks over at him, “You’re a piece of work... Bill.”

Bill tips his head in acknowledgement. “Sure can’t argue with that,” he grins mischievously

She cannot help herself, she grins back.

“That’s more like it,” Bill flashes his megawatt smile at her. “Look, if we’re to match, we need to get to know each other and you don’t do that by playing it safe.”

Martha pauses, “Yes, I suppose you’re right.”

“You know I’m right because you’ve been doing the same thing,” Bill smiles when she shrugs.

A few minutes later, Bill parks the rover back at Hawking Spaceport. “Do you want to see your camp module now or later?”

You've already have had a long day. No one would blame you if you wanted to get some sleep."

"I'm fine. I would like to see it," she replies.

He loads the coordinates to his shop into her handheld. "Come by when you're ready."

"Thanks for the day trip," Martha says accepting the small device and brushing Bill's hand in the process. "It was a unique first date."

Even through the suit, her touch sends a shockwave up his arm. Bill smiles, "De nada..." Yes, there's definitely chemistry. Bill's enjoying this little game way too much. It must be illegal somewhere.

An hour later, Martha walks through the door of Bill's shop. Dominating the center of the room is a large cylindrical LOX tank lying on its side. At over ten meters in diameter, it towers over her. Midway down its length, she spots Bill among a small group gathered around a workstation near the bottom of a short ramp. Other work centers are scattered around the shop, CNC machines, 3D printers and over in the corner, an arc furnace and casting station. An intense metallic growl echoes harshly in the cavernous space and flying sparks from a grinder catches her eye at the far end of the shop.

"Is this my camp module?" Martha asks as she walks up, sweeping her gaze over the entire structure. It's bigger than she had imagined it would be.

Bill welcomes her with a smile, "Greetings Martha! Yes, it is. Before we're done, it will have all the amenities of home. A living room, bedroom, bathroom, food, air, energy and water recycling, table, stove, refrigerator, even a pantry. Four people will be able to live here comfortably for a month without restocking. The airlock is

the last thing and that will be finished later today, unless something comes up.”

“May I go in?” Martha asks.

“Of course. Let me give you the grand tour,” Bill offers her his arm.

Martha ignores the gesture and walks past him with the barest hint of a smile.

Bill shrugs. If he lives to be a thousand, he will never understand why girls like to play these silly games. “Watch your step and stay on the scaffolding going through the airlock.”

“I can manage,” Martha says without slowing down.

“I’m sure you can...” Bill follows the lithe figure up the ramp, appreciating her hips rocking gracefully side to side as only a woman’s can.

At the top of the ramp, Martha looks with interest at the outer airtight door then examines the dust collectors built into the threshold, nodding her head in approval. Moving deeper into the lock, robo welders, each about the size of a mouse, work feverishly on the internal structure. She cannot see them but the intense lights of their arc welders dance behind the cracks that remain. She steps past the inner airtight door into the module itself.

“This floor is the main living area, just over 200 square meters,” Bill informs her. That’s the size of a four bedroom home.

“Could fool me,” Martha says. From inside, the module seems small and crowded. She quickly walks through it, sticking her head in the kitchen area at one end and the two bedrooms and the toilet at the other, “This could have been a little bigger,” she says frowning at the shower.

“It’s standard size, I assure you,” Bill responds.

Martha pulls at the curtain, “Is this supposed to be a wall?” she asks.

“It’s a modesty barrier. I suggest you invite only good friends to stay with you here,” Bill says with a straight face.

Martha looks sharply at him, “I’ll keep that in mind.”

With a sparkle in his eye, Bill says, “Let me show you the lab. This way.”

Bill leads her up another ramp, this one inside the module. “The second floor mirrors the first, about 200 square meters, but it contains the main water tank at that end and your lab at this end. The bedroom below the tank is the emergency shelter in case of a solar storm. Your telescope control center is over there, behind the power station.”

“Very cozy,” Martha says. The module definitely looked bigger from the outside. “Of course, people will only be here for short visits so it doesn’t need much.”

“Those people will depend on it for their lives. I’m not cutting any corners just because it will not be lived in permanently,” Bill says.

“I’m not suggesting that you cut any corners. I will be one of those people soon enough and I don’t want to worry about your workmanship,” Martha says matter-of-factly.

“Nothing but the best is going into this module, I assure you,” Bill says tersely.

“Don’t take it personally. Can you show me the sighting telescope?” Martha asks.

“Up that ladder,” Bill replies. He lets her go first, watching her climb to the attic. Martha makes it look sexy.

Running like a hollow spine down the length of the module, the curved ceiling seems lower than its two meters and betrays the modules cylindrical shape.

“The space above the second floor is called the attic. The space below the first floor is the cellar. Most of the air recycling is up here

and the waste recycling is in the cellar,” Bill says.

“Where’s the telescope?”

“It’s mounted on top of the module. The emergency escape hatch is over there,” Bill indicates with a wave of his hand. “Maybe you should let me go first.”

Now it’s Martha’s turn to appreciate the male form. Bill is lean in the hips with broad muscular shoulders. He hangs on to the ladder with one hand and twists open the hatch with the other. He climbs through and looks down at her, “Come on up.”

Bill helps Martha get to her feet. They are on top of the module, over ten meters above the shop floor, standing on a metal catwalk welded to the outside of the tank. Her precious telescope is mounted a short distance away on its own pedestal.

“I hope you aren’t scared of heights,” Bill says.

“Now’s a good time to ask,” Martha replies, covering the distance without any visible discomfort.

Martha goes over the device expertly, manually running the scope through its range of motion. The telescope is only a meter in diameter but much bigger than what she had as a kid. Her father had helped her build a 24-centimeter telescope from a kit. They had ground the lens and everything.

Nevertheless, this little telescope is a powerful instrument, not a toy, even if it is only a tenth of the size of a Grid telescope.

“I want to run a full diagnostic. It will take about two hours. When can I start?” Martha says without looking at Bill.

“Everything’s ready now. Let’s return to the control station and run it from there,” Bill suggests.

He leads her down the ladder and stands by in case she might slip. She passes within millimeters of him, her smell washing over his senses. At the bottom of the ladder, Martha pauses and looks up at Bill. Several long moments pass when neither of them moves. It’s

all Bill can do not to lean down and kiss her but that would change everything. Martha moves away before he tries something.

Taking the seat at the workstation, Martha quickly pulls up the software and initiates the diagnostic program. Bill moves where he can watch over her shoulder. Together, they feel the small telescope hum into life overhead.

Bill leans down and says softly into her ear, “Nothing to do now but wait.” He’s well aware of the bulge Martha’s nipples are making in the tight fabric of her blouse. He’s not the only one feeling the chemistry.

With his breath still hot on her cheek, she catches Bill staring. She smiles knowingly, “The final test will be at Cormac Crater.” She is also enjoying the sexual tension building between them. “How soon before the module can be delivered?” Martha asks softly.

“It’s on the schedule for tomorrow morning. I have two techs and my best pilot slotted to help with the deployment so it should go smoothly. Maybe a couple hours,” Bill responds.

“Excellent! Then I will see you tomorrow morning,” she says rising to her feet and batting her eyelashes at him. “Thanks for the tour.” She walks away without so much as a backward glance.

“Tomorrow morning oh-eight-hundred sharp,” Bill says. He can no more ignore the sway of those hips than he could stop breathing. He’s a patient man and some things are worth waiting for, but this is excruciating.

The module rolls slowly out of the workshop on a construction dolly made just for this purpose, easily clearing the big hanger doors. It takes only minutes for the ungainly vehicle to navigate the track leading from the shop to the flat field a few hundred meters away. Two people climb to the top and secure wide straps around the body, one at each end.

A Boeing Skycrane appears and takes a position about twenty meters above the module. In the shape of a giant X, two massive outriggers cross over its back, a powerful electromagnetic thruster at the far extremity of each. The four thrusters are capable of lifting something many times the modules mass. Two heavy lines drop from it and Bill's team hooks the straps to them. The two quickly scramble down the hatch and moments later, exit the module. It's against the rules to ride inside the module while the Skycrane moves it.

Bill monitors the process from the rover's driver's seat. Carol and Steve know what they're doing and don't need him looking over their shoulder micromanaging this simple task.

"Well, I see you're ready to go," Martha climbs in beside him, splendid in her white vacsuit.

Bill doesn't turn but keeps his eyes on the Skycrane and his team heading towards the rover. "Good morning Martha. A splendid day, don't you think?"

"Isn't one day pretty much like all the others around here?" Martha asks.

"Depends on your point of view, I guess," Bill says flashing his smile.

The Skycrane slowly tightens up on the straps and picks up the module leaving the dolly behind. Moments later, it's dangling fifty meters above them. Lumbering through the sky, the assemblage starts in the direction of Cormac Crater.

Bill sighs. Everything's going smoothly, perhaps too smoothly. "OK! Let's move it," the two crewmembers climb aboard the rover and settle into seats behind Bill and Martha's.

Bill waits just long enough for them to buckle their seatbelts then guns the rover. "The lady behind me is Carol Baker."

"Hey! Who you calling a lady?" Carol exclaims with a grin. "I

work for a living.”

“Steve Marling, Martha Taranto.” The young man nods his head to Martha when she twists about to look at him.

“Pleased to meet you,” Martha says.

“Steve don’t say much but I do. So you’re the one that proposed to Bill?” Carol asks, knowing the answer.

Martha looks back at her, “Yes, I guess I did.” She glances at Bill. He has a neutral expression on his face.

“So what made you do such a thing?” Carol asks.

“You mean other than his handsome face, great body and brains? I couldn’t tell you. Maybe it was the way he treats the workers he supervises,” Martha responds.

Carol stares at her for a moment, “Naw, that couldn’t be it.”

“Why don’t we just drop it,” Bill says over his shoulder.

“Awe, boss. This has never happened before. I just...”

“I said drop it,” Bill repeats.

“Fine! Just when things get interesting, you have to shut it down,” Carol sighs and stares out the rover’s window at the passing terrain. She has been with Steve for over a year but she knows it’s not permanent. Nothing’s permanent up here. Change is the norm and partners come and go.

The module is in place by the time they get there. Steve and Carol make short work of covering it with regolith. Only the airlock and the telescope atop its pedestal are visible, protruding from the lunar soil.

Inside the module, Bill and Martha have removed their vacsuits and Bill is checking the various systems. Everything is in the green. He signals Carol, “Carol, you and Steve return to Aldrin Station on the Skycrane. Martha and I will stay here and complete the safety checks.”

“Right, you and Martha...” Carol says with a grin. “Come on Steve. I know when I’m not wanted.”

On the big monitor in the living room, Bill and Martha watch the Skycrane rise and move back towards Aldrin Station. Alone at last, Bill walks over to the refrigerator and rummages around until he emerges with a bottle of champagne. “I have been saving this for a special occasion. I believe this qualifies.”

The sharp pop of the cork makes Martha giggle. She kicks off her shoes and accepts the drink Bill offers her.

“Sorry, all we have are these aluminum glasses,” Bill says.

“No woman has ever had a finer honeymoon suite. Here’s to us!” Martha giggles again at the metallic ring as the glasses came together. She has never been happier than at this moment.

The two of them have been on this trajectory for months. Now, anticipation lies behind them and the time for action is at hand.

“To us!”



"I BELIEVE THE UNIVERSE IS ALIVE AND WE ARE BUT EXPRESSIONS OF IT."
MARTHA TARANTO (2011 – PRESENT)

University of Luna, Aldrin Station - April 2, 2039

Bill quietly slips into the astronomy lab. Weaving his way through the maze of equipment, he creeps up behind the unsuspecting woman. Martha is so engrossed in her work, she never hears him coming.

He reaches over the chair arm and pokes her in the ribs, his burly fingers digging into her side, "What's up!"

Martha jumps to her feet sending the chair reeling across the room in Luna's light gravity. She swings about to face her tormentor. "Stop doing that!"

With a grin, Bill pulls her to him. "OK fine, I promise to never sneak up on you again." His big hands almost encircle her waist.

"Bull! You said that last time!" She pushes against his chest but not with any real conviction. Martha's glad he's here. She needs his strength in this time of weakness. Spiritually, she's deflated, full of nothing.

"Yes... but this time I mean it," Bill says with a politician's conviction.

Martha shakes her head, she knows better, "You're such a juvenile," but she cooperates when he leans down and soundly kisses her before abruptly pushing him away. Retrieving her chair, she says tersely, "Now's not a good time, Bill. Is there something in particular?" She sits down at her console, her face a ghostly shade of pale.

Something's wrong. "Now that you mention it, there is." Moving up behind her, Bill begins to massage her neck and shoulders. "Honey, you're tight as a drum. Relax..."

She lays her head back and sighs. Maybe everything is fine. Stop jumping to conclusions.

Bill glances at the main screen. It contains an astronomical body roughly spherical, looking like a dirty potato. Down in the corner, tracking numbers mark its path.

Bill asks, "What're you working on?"

"Last month I found a new NEA."

"Congratulations..." Bill smiles, nods, and continues the massage.

"Near Earth Asteroid."

"I knew that," Bill replies, glancing down at her console screen. Numbers scroll by too fast for him to read.

"Sure you did."

"Why's it important? You have found dozens of NEAs." Something's really eating at Martha. She's never this short with him.

A beep sounds from her console and Martha leans forward with Bill peering intently over her shoulder. The numbers have stopped scrolling. A moment later, Martha slumps down in her chair and utters, "Oh my god..."

"What's the problem?"

The look of shocked disbelief on Martha's face makes him take a second look at her screen. He's a mechanical engineer. The numbers mean nothing to him but following the last row is a statement:

Tracking Trajectory Simulation – 98.7% Impact Probability

"Martha, what's impacting?" He glances up at the main screen.

"It must be a mistake. I need to input the data again and



recalculate. This has to be wrong...” Martha begins feverishly entering data.

“Where’s the impact point?” Bill asks.

She doesn’t answer.

Bill watches without saying another word. All thoughts of dinner are on hold. Sure, he’s messed with her but that was a game. Her expression now is one of desperation and outright fear. Whatever has frightened her, one thing he’s sure of, she doesn’t make input errors.

Numbers again scroll across the screen with the leftmost column consistently growing smaller. He stands quietly behind Martha watching until it finally reaches zero on the very last entry. The next line reads:

Trajectory Tracking Simulation – 98.8% Impact Probability

Martha stares blankly at the declaration. He lays a hand on her shoulder. She looks up.

“Where’s the impact point?” Bill asks again.

Her blue eyes plead with him. She didn’t want to say it. She didn’t want to be the first human to talk about what is coming. He returns her gaze steadfastly, willing her to speak.

“North Africa, the Sahara,” she whispers.

“When?”

“December 8, 2064,” he can barely hear her.

“That’s twenty-five years away. Are you sure?” He regrets asking the question as soon as it’s out of his mouth.

“No! I’m not sure! That’s why I rerun the numbers!”

Bill holds his hands up in surrender. “How big is it?”

“It’s the size of Vesta. Over five hundred kilometers,” Martha says. Vesta is the second largest body in the Asteroid Belt.

Bill sits quietly for a moment staring at her, letting all the implications sink in. “We need to tell Abby.”

“Not until I run the numbers again. Maybe I made a mistake and everything’s fine.” She doesn’t believe it for a second and neither does he.

The conference room is a great oval chamber cut from solid stone, twice as long as it is wide. The conference table is a ribbon of stone following the room’s contour along one side with just enough space for its swivel chairs and a row of lesser chairs right against the wall. An impressive array of small monitors confronts the table, taking up the entire wall facing the chairs, almost a hundred in all. A larger main screen is mounted on the wall at one end, at the other is a small podium resting on the polished stone tabletop. Beyond the podium is the entrance door. This is the largest Earthnet-capable conference room on Luna.

Martha takes a seat at the far end along the back wall close to the main screen. Others from Aldrin Station enter and sit at the table, casting furtive glances her way.

Abigail Dugan enters the room and moves gracefully to the podium resting on the table at this end. Isaac Crenshaw is there waiting for her, his open handheld sitting on the table beside the podium.

“The strike is confirmed. Representatives from the Federation, the Europeans and the Chinese as well as people from Boeing, EADS, General Dynamics and Lockheed will attend. This is just a planning meeting to get the ball rolling but you know how these things go. You will need to keep a tight rein or nothing will get decided.” Izzy looks worried and that in itself makes Abby worry. Their friendship goes back to the very earliest days on the moon. She has learned to trust this man almost as much as she trusts her husband Patrick.

Abby frowns and says sarcastically, “Aye, like that’ll happen...

These people don't like to be handled, Izzy. You know that. Most of them don't know what a magnetoplasma thruster looks like or could tell you what a Hohmann transfer is but they will decide how we respond to this threat." Abby shakes her head. This is the biggest challenge humanity has ever faced and reason must prevail.

Martha rests the back of her head against the wall and closes her eyes. Bill is one of the last to arrive. He looks around until he finds Martha, moving quickly down the narrow aisle and taking the seat next to her. She opens her eyes just long enough to see who it is. Bill squeezes her hand and smiles but not even that can cheer Martha. She feels drained of all hope for the future. All she wants to do is go home and be with their son.

Abby leans over and uses Izzy's handheld to designate seats five and six as reserved. Director Mary Trask, the Federation's Chief Administrator at Purgatory Deep Hole grumbles and finds another seat further down the table.

At exactly 6:15 AM Greenwich Standard Time, the faces of the world's leaders begin to appear on monitors mounted along one wall. She stands facing them. Abby's been under the microscope a few times but nothing compared to this.



"Thank you all for attending on such short notice," she says by way of bringing the meeting to order. "Let's begin... Deep Space Command has confirmed Doctor Taranto's findings. The asteroid will hit the Sahara a little after nine in the morning on December 8, 2064."

A graphic on the main screen tracks the progress of the asteroid as it plunges through the solar system and strikes Earth.

"Pardon... what can we do to prepare for the impact?" Malcolm

Gaines is the newly elected French President. He's been on the job less than a month.

"Doctor Taranto, you and Bill want to join us at the table and answer that?" Abby asks. It wasn't really a question.

Martha would rather be anywhere but here. "Sure..." She and Bill take their place at the table. Martha addresses the monitor showing President Gaines. "The impact will shatter the Earth's crust like a bullet hitting a watermelon. First, a shock wave will travel around the world at hypersonic speeds creating a global earthquake thousands of time bigger than any in human history. Next, a firestorm will encircle the Earth burning everything the earthquake leaves behind. Then over the next few millennia, debris blasted into orbit will fall back to Earth destroying what's left. It's the end of life on Earth. How do you propose we prepare for that?"

The time delay between Earth and Luna is only seconds but it seems like hours. President Gaines expression sours as Martha's words sink in.

"It can't be that bad," Germany's Chancellor Jorgensen says. What he knows about astronomy can fit into a thimble. "What about the air? Asteroids burn up in the air every day!"

"You're right, small meteors do burn up in the atmosphere every day," Martha nods in agreement, "but this is not a small meteor. Or even a large meteor for that matter. This is a small planet coming at us. The Earth's crust is about thirty kilometers thick, the atmosphere is about a hundred kilometers thick, but this chunk of the universe is over five hundred kilometers in diameter and made of solid nickel/iron. Do the math... The atmosphere will not even slow it down."



Silence smothers her words.

Finally, Chancellor Jorgensen asks, "Where did it come from?" His screen is well away from where Martha and Bill are sitting.

"It's God's judgment," Director Trask says plaintively from the far end of the table. She's an active member of the American Church of the Trinity or ACT. ACT has claimed for years that global climate change was God's hand on humanity. They will have a field day with this news.

Martha turns to stare incredulously at the women. "Asteroids are part of our universe like planets and stars, and getting hit by one is a natural process like earthquakes and tidal waves. Four and a half billion years ago, an asteroid very similar to this one hit Earth and created Luna. At least six major impacts have occurred in Earth's history and each one has transformed the planet. This will do the same."

"Tell me again, why can't we deflect it?" Bill asks Martha.

Martha looks down at him, "Because my love, it mass's five to the power of twenty kilograms. That's five with twenty zeros behind it," she says for the benefit of others. "To deflect something that big is impossible."

"Impossible! Well... why didn't you say that in the first place? I specialize in impossible," Bill flashes one of his patented smiles at her but Martha's not buying it.

Her face clouds up, "Is everything a joke to you?"

Bill's smile grows wider and he holds his hands out in self-defense, "Pretty much... Look, Marti, I realize it's big but that doesn't mean we can't affect it. You've given us twenty-five years. We can do a lot in twenty-five years."

"Is it rotating?" Doctor Thomas Boughan is a retired mathematics professor and one of President Bertrand's most trusted advisors. The fact that he is in this meeting means the

Federation is taking this seriously.

“Yes, but slowly. About once every thirteen days,” Martha responds. “Precession is negligible.”

“Where exactly is this monster asteroid? By the way, why don’t we have a name for it yet?” Boughan hates inefficiency and as a major government liaison, learning terminology is the first thing he does when tackling a new issue.

“As its discoverer, Doctor Taranto has the right to name it,” Abby says.

Martha stares at her in horror, shaking her head no without realizing she was doing it. This is no honor! Far from it, this is a curse. She turns woodenly to face the screen showing Boughan, “The... object... is in the constellation Apus and will be passing inside the orbit of Neptune in about a month. Its current speed is just over a kilometer per second but that will increase substantially as it plunges towards the Sun. It will be many times that when it hits Earth.”

“Bird of Paradise,” Heather Hurley says. She has a PhD in astrophysics from Cambridge and has been on Luna for over six years. Technically, Martha works for her.

Martha looks down the table at her boss. “Heather, are you suggesting we call it Bird of Paradise?”

Heather shrugs, “Apus means Bird of Paradise.”

“You want to call God’s angel of death... ***Bird of Paradise?***” Director Trask spits out the words incredulously, staring at Martha as if the young astronomer has suddenly grew horns and smells of sulfur.

“Maybe god’s giving us the bird?” Bill declares flashing his dazzling smile. The conversation stops like it hit a brick wall.

Martha’s expression is not hard to read. She puts her head in both hands but instead of crying, she laughs. A number of others

join in. The comment breaks the tension for some, increases it for others.

“Find something appropriate!” Boughan is clearly not amused.

“Fine... Call it Paradise,” Martha responds. She didn’t care. What did it matter?

Trask is stunned, her mouth opens and shuts but she remains speechless.

“That’s it then. Official designation is...” Izzy glances at his handheld, “NEO 912458 Paradise. Bill, didn’t you want to say something?”

“Aye... after doing some rough calculations, I think we can move it,” Bill says. The world’s leaders turn towards him and he turns to Martha, “Before you say it’s impossible, let me run these numbers by you. If we could sustain a hundred and fifty Giga Newtons of thrust for twenty years, Paradise would miss Earth by about fifty-thousand kilometers.”

“Modern thrusters are capable of only hundred and fifty kilo Newtons. That’s a huge disparity, six orders of magnitude.” Martha hates having this conversation in front of all these strangers. She understands the situation perfectly. They were all going to die and there wasn’t a damn thing anybody can do about it. Yet, a candle begins to flicker in the darkest corner of her despair.

Bill nods in agreement, “Magnetoplasma thrusters are much better than they used to be but you’re right, we will need a design capable of generating at least ten Giga Newtons. I asked a friend of mine to take a crack at the problem. His name is Professor David Ghandehari. He’s on the faculty right here at the University of Luna. Professor?”

The face of a middle-aged bald man appears on the main screen.

“Let me begin by congratulating Martha on finding Paradise for

us when she did. Given enough time, we can move anything!" The image of Professor Ghandehari shrinks and slides into a corner of the screen. In its place appear several diagrams and some rather complicated looking mathematics. "The key to developing a Giga Newton class thruster is not in accelerating the plasma. We know how to do that and scaling up the nozzle is straightforward. Granted, it will be big, but we can do it. The real problem is sustaining the mass flow rate through the thruster."

A cross-section of a magnetoplasma thruster appears on the screen with equations beside it. "As you can see, the Mega-Thruster accelerates two-hundred and twenty-five kilograms to fifteen percent the speed of light in about a kilometer." Professor Ghandehari looks around the room from his screen. He has everyone's attention but that won't last. He needs to be brief. "The trick is... it must do this every second for twenty years."

"That's not possible," Vice Premier Hu Jintao explodes. "What you say cannot be done!" The Chinese economy is in the midst of a massive recession and money's tight. "The size of this project will bankrupt the world!" All he's really concerned with is China.

"We have no choice!" Governor Ahmed Ben Balla responds vehemently. He's from Algeria, the country where Paradise will hit. He's taking this very personal. "Don't be an idiot!"

"Governor! That's enough. Let's keep this discussion civil," Abby says sharply.

Before the governor can respond, Boughan asks, "OK Professor, I'll bite. Where will you get the fuel for this ginormous thruster?" He's ever the practical one, a trait that has served him well in politics.

Professor Ghandehari beams at his audience, obviously pleased with the question, "The beauty of my design is that it uses the iron in Paradise itself to fuel the thruster!"

Someone off camera says, “Professor, tell them about my project!”

Professor Ghandehari glances sideways with a flash of annoyance then continues, “One of my more gifted grad students, Julie Mason Meade, has been working on a design of a high-capacity plasma generator. I believe it can be scaled up to utilize the iron in the asteroid to attain the quantities of plasma required. If I’m right, then we will have an inexhaustible supply of fuel for the thrusters. Paradise itself!”

“That’s great but where are you going to get the power necessary to do all these things? I assume this plan needs electrical power?” Boughan asks.

“And lots of it. Heating iron to plasma temperatures is very energy intensive. Nuclear fission is the only choice. It has two things going for it. One, we’re familiar with the technology and two, it will operate at the edge of the solar system without interruption for decades.” Bill says.

“By your numbers, we will need more than one thruster. How many do you propose to build?” Boughan asks.

Professor Ghandehari looks down at his notes, “Somewhere between fifteen and twenty should do the job.”

“How long will it take to build one?” Boughan asks.

“We must first develop the infrastructure... I estimate about two years for the first Mega-Thruster but much less for every one after that,” Professor Ghandehari responds.

“Where do you propose to build them?” Boughan asks.

“Bill?” Professor Ghandehari passes the ball back to the young engineer.

Bill keys a file from his handheld. A graphic of the Earth-Luna system appears on the main screen. He’s in his element, “We will need to expand Calconn production in Aldrin Station, Shennong,

and Kyoto, add dedicated mass drivers to lift it off Luna, and scale up Hyundai Shipyards. Specifically, the Nanotech Assembly Center will need a major upgrade to handle the size of a Mega-Thruster. We will also need a number of deep space construction teams to install each thruster and more people to run the show once it's underway. This will be the biggest project the world has ever undertaken!" His obvious glee at the prospect rubs a few in the meeting the wrong way.

"Why are you happy? This is a disaster!" Prime Minister Melissa McCann frowns.

Bill turns to her screen, "Yes, of course it is, Madam Prime Minister, but it's also an opportunity like no other in our history. This will pull humanity together. Our species has always thrived on the impossible! We can do this! We must take our technology to another level but I have the upmost confidence in our ability to pull this off."

Prime Minister McCann's frown deepens, "I'm glad you do but I'm not so sure. There are major obstacles to overcome and we have a tendency to shoot ourselves in the foot. I refer to the issue of global climate change. We allowed things to get bloody ugly before taking action."

"That's true but we finally did and that's what we need to build on," Bill replies.

"Who will pay for this? What you are proposing will bankrupt the world's economy!" Vice Premier Hu Jintao repeats.

Bill frowns, "**Money!** You want to talk about **money** while Paradise blows Earth to hell! What use is **money** if everyone's dead?"

"America will not get out of repaying their debt to China because of this," Vice Premier Hu Jintao declares.

"With all due respect, sir, this is not the time to play politics,"

Bill says sharply.

Vice Premier Hu Jintao glares at him, “I assure you young man, I do not play!”

“What Rogers meant to say is that this is the biggest engineering challenge the world has ever seen and failure is not an option,” Abby says. “Turning Paradise will take the very best minds we have. We need your help and you need ours. We must find a way to work together or we will die together. It’s that simple, Vice Premier... Do whatever you need to do but keep in mind, time is short.”

Vice Premier Hu Jintao continues to glare at Bill the entire time Abby is speaking. He doesn’t trust the Federation or the European Union for that matter. Western arrogance spans centuries and not easily forgiven. “Send the detailed proposal and I will consider it.” He gestures to someone off camera and his sour visage disappears.

Thinking about what Bill and Professor Ghandehari have said, hope grows within Martha. There are many smart people in the world, if only the politicians will listen to them.

The discussion rages on for several more hours under Abby’s skillful mediation. She eventually coaxes a consensus from a few key members and adjourns the meeting. She asks Martha and Bill to stay for a moment. They remain sitting while the room empties and the monitors turn gray. Abby nods to them and says, “Well done, both of you.”

Sometime in the last few hours, Bill had lost his smile. He shakes his head, “I still say this will not bankrupt the world, just the opposite. It will energize the world!”

“I hope you’re right,” Martha says laying her hand on his.

“I agree with you Bill,” Abby sits down on the other side of Martha, “and so do most of the corporate leaders. They see dollars plastered all over this project. It’s as big as the original moon

colonizing effort and look what that bought us. Power satellites alone are worth ten times what colonizing cost. This will be the same.”

A face appears on a nearby monitor. It's Boughan. “I hope I'm not keeping you from something important?”

“No sir! Not at all,” Bill responds. Martha shakes her head.

“Good! The Paradise Project will quickly take on a life of its own and I want to get a jump on things...” He looks down and shuffles through a sheaf of paper, not really seeing them but using the action to help him organize his thoughts. He looks up, “Bill, you handled yourself well under fire, didn't back down and you're certainly not afraid to speak your mind. I like that. When I asked Abby to recommend someone to run the show, your name was first out her mouth.” He leans forward and looks intently out of the monitor at Bill. “I'm offering you the job of Paradise Project Director. You will have full authority to manage project resources, make day-to-day decisions regarding the project direction, and staff the project. You think you can handle it?” Boughan watches Bill for any hesitation.

That brings the smile back to Bill's face, “Hell yes! ah... I mean, yes sir!”

Boughan appreciates his enthusiasm, “Good! I will fast track the paperwork but it will still take a few weeks. Government bureaucracy.” He turns to Martha. “Doctor Taranto, I congratulate you on discovering Paradise. If I understand the physics involved, even a few months delay would have been catastrophic. You may have saved us all.”

Martha's extremely uncomfortable thinking such thoughts. “It could have been anyone,” she mumbles.

“Yes, but it was you,” Doctor Boughan says. “The Paradise Project will need a Senior Astronomer. You interested?”

She stares at him for a moment. She wants to refuse but how

can she? “Of course, sir, I will do the best I can.”

Boughan chuckles, “So far, your best is extraordinary!” he leans back and stares at them. “You two make quite a team. I understand you have a child?”

“Aye, a sixteen month old boy, Robert Cormac Rogers. He’s named after my father,” Martha replies.

“Excellent! Family’s important.” Boughan already knew everything there was to know about this couple. Their deep family roots were a major selling point in his decision to put them in charge. People need something to fight for, something that makes any sacrifice worth it. “It’s settled then! Thank you both very much. I will be in touch...” His image fades away.

“Congratulations!” Abby says with a smile. She had recommended them for the job but wasn’t sure Martha would take it. She had no reservations about Bill. She knew he would jump at the chance.

Bill flashes his megawatt smile at her, “Thanks Abby, for having faith in us. We will not let you down!”

Abby smiles back, “I know... You come directly to me if you have any problems. The resources of Aldrin Station are at your disposal.”

Martha still looks unconvinced. She wants to believe. She simply can’t. Paradise is a planet! Humans can’t move planets. The very idea is ludicrous.

“Martha, when you’re in a no-win situation, doing something is always better than doing nothing,” Abby says to her.

Bill turns his charm on, “Marti, it would drive you nuts if you sat on your ass and let someone else do the hard work...” When she remains quiet, “Doctor Boughan’s right, we make a hell of a team!”

Martha slowly nods as Abby walks around the table, “Let’s get busy then,” Abby says.

Bill and Martha follow her through the door. He towers over her by almost a foot. Bill puts his arm around Martha and pulls her close. She leans her head against his chest, wishing that some of his optimism would rub off on her. They are both thinking about the future, about Turning Paradise.



"WE HATE WHAT WE FEAR; WE FEAR WHAT WE DON'T UNDERSTAND."
BILL ROGERS (2009 – 2059)

Lincoln County Hospital, Aldrin Station - Dec 24, 2065

Lincoln County Hospital is one of the premiere medical facilities in the fledgling Republic of Luna. It's the birthplace of biotronics and home to Lunarian genetics and reconstititional science. Constructed in 2024, before high-energy laser technology revolutionized excavations, it's one of Aldrin Station's first habitats. Some of its chambers still exhibit mechanical tool marks, left to remind Lunarians of their heritage.

But not this one. This room is special. It's a Lunarian birthing chamber. Carved from solid rock, it is a smooth polished bubble of air in a sea of stone. The chamber's interior has two tiers. On the upper tier sits a naked woman, her legs splayed apart, hands gripping convenient holds, her body supported by a sophisticated birthing stool. Below her on the bottom tier another woman dressed in a doctor's white gown takes a position between the legs of the expectant mother. Two orderlies, one male, one female, flank the doctor, staying out of the way.

Robert Rogers enters the birthing chamber and approaches his mother, "Paradise is nearing perigee with Earth."

"Put it up," Martha grunts. She's been in labor for almost an hour.

The wall facing Martha and Rob vanishes, exposing what lies beyond, the stark blackness of space. They pause for a moment,

taking in the incredible scene laid out before them. The Earth dominates but on the far side of his planet, Paradise shines brightly in the sunlight. If he stares at it for just a few seconds, he can even see it move.

“Dad should be here,” Rob says.

“Robert, you know he didn’t have a choice. It’s true, you know... the project would have failed if he hadn’t sacrificed himself. And instead of watching Paradise sail harmlessly past Earth, we would bear witness to its destruction.”

“I know mom, I’ve heard it all a thousand times but I still wish he were here,” Rob says with a heavy heart. “I can understand why some people want to believe in the afterlife.”

“Yes, it sounds comforting at first, that your dead loved ones are always watching over you, but it’s simply not true and Lunarians don’t condone falsehoods,” Martha says.

“Get ready. The next contraction is coming,” Lori says without looking up. She is the Director of Pediatrics in Lincoln County Hospital and one of the best pediatricians in the Republic of Luna. Nothing less will suffice for this birth.

Rob swabs Martha’s forehead with a damp cloth.

“I have had that same wish at times,” Lori says never taking her eyes from the medical readouts she is monitoring. She had lost her father-in-law, Patrick Dugan, just a few years before in a mining accident. “My husband, Henry, and the Dugan family celebrate Patrick’s birthday every year keeping his memory alive but there’s no doubt that death is the end of life. Just as there’s no doubt that today we celebrate the emergence of a new life.”

Martha grips the handles and looks down between her legs. All she can see is the top of Lori’s head. A wave of pain washes over her and she moans.

“Breathe mom,” Rob says.

“Bear down!” Lori adds sharply.

Rising like some primordial beast, the scream starts softly but quickly builds into an earsplitting roar, “Don’t tell me what to do!” She pushes. Smoothly, like a well-oiled machine, Martha’s hips expand and she gives birth to a four-kilogram baby boy. The pain vanishes and she gasps like a fish out of water.

“Perfect!” Lori exclaims. “Magi, how does it look?”

“All systems normal. I am monitoring the blood flow through the umbilical,” Magi responds.

“I want to see him,” Martha breathlessly orders.

“Ohmagod! That was incredible! Mom, you were fantastic!” the tiny chamber can barely contain Rob’s excitement. It’s his first birthing.

Lori holds the baby up, careful of the umbilical, “He’s beautiful!” Lori exclaims smiling at Rob’s reaction. Men can be so childish.

Martha smiles gently. Yes, he is. It has all been worth it.

“Ohmagod! Ohmagod!” Rob exclaims staring at the tiny face.

“Robert, I would like to introduce you to your brother, William Tell Rogers Jr., who just happens to be genetically identical to your father, right down to the last DNA sequence.” Martha glows, excitement animates her face and sweat glistens across her brow. She has missed Bill terribly since his unfortunate demise. Having this baby, at this time, at this place is anything but an accident. She is happy and sad at the same time.

“In a way, dad is here,” Rob exclaims.

Martha wrenches her eyes away from her newborn son and looks at her full-grown son. She sees her husband in Rob. The same smile, the same easygoing demeanor, Bill’s love of life. She reaches out and takes his hand, “Absolutely, in a very big way.”

“Blood flow through the umbilical is near zero. It’s time to cut

the cord,” Magi informs Lori.

Lori applies the clamps and picks up a laser scalpel. “Rob, come over here and do the honors,” Lori motions to him.

Rob takes the scalpel and very carefully, cuts where she indicates. A few drops of blood fall to the floor.

Lori takes the baby to a washstand and begins cleaning him while the two orderlies help Martha deliver the placenta. Within minutes, they have cleaned her up and adjusted the birthing stool into a more comfortable chair.

“Thank you, dears,” Martha tells them.

“The timing couldn’t have been better,” Rob says. Paradise is beyond the Earth and moving away. Just minutes before, the killer asteroid passed inside Luna’s orbit and was at its closest approach to Earth. Twenty-five years of terror ends amidst the cries of a newborn.

At Martha’s behest, Lori brings the baby to Rob. The man accepts the bundle gently in his arms. Looking into the tiny face, emotion washes over him. He holds the child, feeling him kick inside the swaddling blanket, “That’s not the last you will see of Paradise. Thanks to our mother, it will be back in thirty-four years. I’ve got to tell you little brother, our mother’s a pretty smart cookie,” Rob says marveling at the miniature hand with its tiny fingers.

Lori smiles and glances at Martha who is radiant.

“By keeping the megathrusters firing, mom calculated an orbital solution that captures Paradise in the Earth/Sun Lagrange Point L5. Our mother found a way to turn that bloody planet killer into something good and beneficial to us all. There should be statues of her in elementary schools everywhere but alas, no one even knows her name,” Rob says.

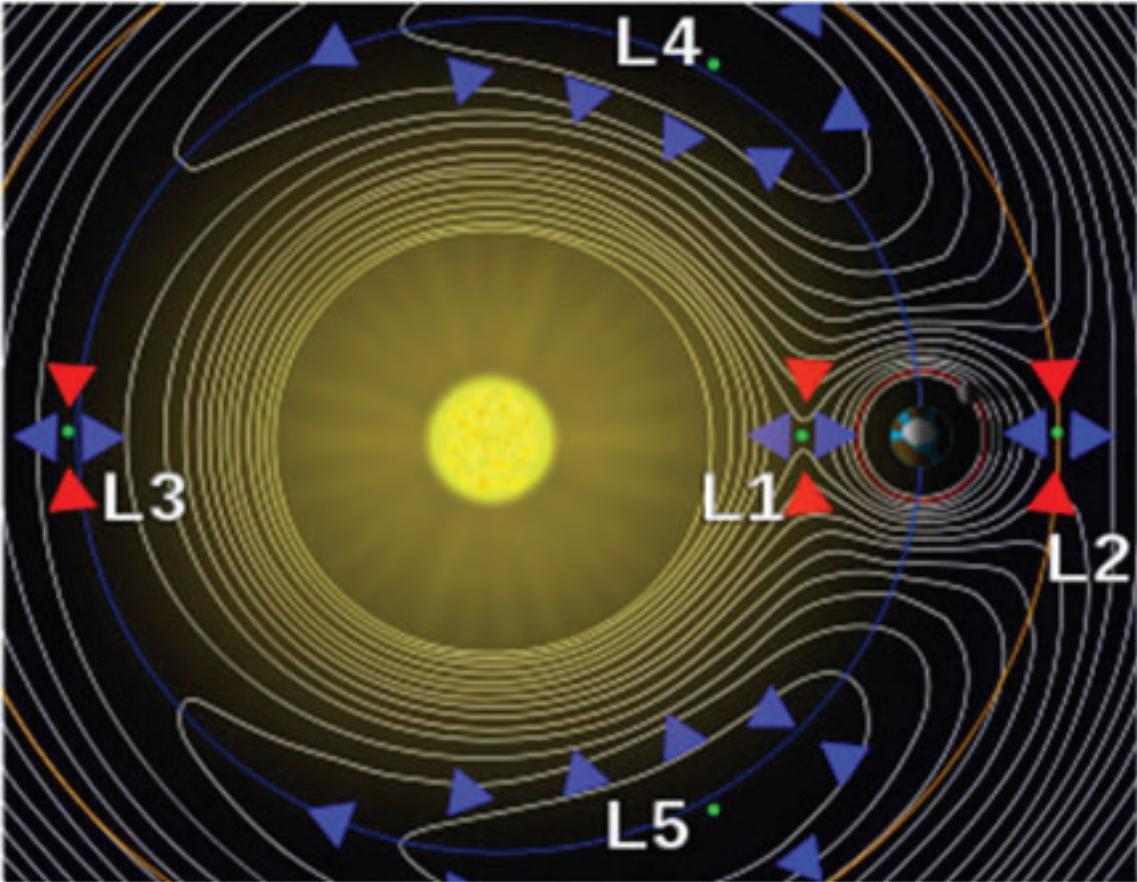
“And I want to keep it that way,” Martha adds.

“Don’t listen to them, little Bill. There are over twenty thousand Lunarians living on Paradise right now that know who she is,” Lori says to the baby.

“By the time Paradise gets back from its ride around the solar system, that number will seem quaint.” Rob shakes his head. “They will all know who Martha Rogers-Taranto is!”

Lori chuckles, “I’ve heard estimates that Paradise will hold ten million citizens when it’s completed.”

“Don’t believe everything you hear,” Martha says with a smile. After today, she finally believes her Bill can move planets.



Name That Character Drawing

As of Wednesday, November 3, 2010, the drawing had 30 Attending, 27 Maybes, 149 Not Attending and 348 Awaiting Reply. With so many attending, I decided to pick two winners, a Male and a Female. But what everyone wants to know is... who won the drawing!

I copied all thirty attending into a Word document in their facebook order (I think it is the order they signed up in), separated them by gender, and assigned each a number. Then I used a free online random number generator to pick a Male and Female winner. I may use some of the other contest names just for fun so even if yours wasn't drawn, stay tuned!

(<http://www.psychicscience.org/random.aspx>)

The Male Winner Is:

[Bill Rogers](#)

Congratulations Bill!

The Female Winner Is!

[Martha Taranto](#)

Congratulations Martha!

Special thanks to Bill Rogers and Martha Taranto and all the others on facebook who participated in *Name That Character Drawing* that resulted in this story. What Great Fun!

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Shadow on the Moon

Author: Charles Lee Leshner

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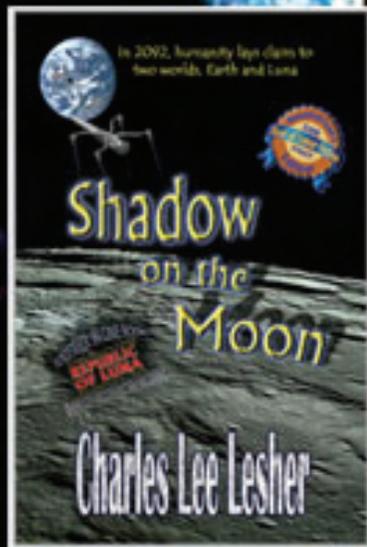
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Description:

In a century filled with strife, the dogs of war are gathering once more. By late 2092, climate change and war have devastated the planet. Even thinned by bloodshed, famine, and disease, Earth's population exceeds 10 billion. Food and water are in short supply, refugee's number in the hundreds of millions and lawlessness abounds. Humanity's in turmoil.

Religious zealots exploit this despair, claiming it's God's punishment for man's misdeeds. Within the North American Federation, Christian theocracy displaced democracy, plunging once proud America into a Dark Age. On the other side of the planet, the Islamic Brotherhood controls a third of the world from Indonesia, across Asia and the Middle East and well onto the African continent. The nations of the world align along sectarian lines as global violence escalates.

In sharp contrast, the Republic of Luna is a humanistic society where information flows freely and nothing is secret, a place governed by reason and the laws of science. Out of necessity, life on an airless world burrows deep underground and to stay alive, Lunarians unlock nature's deepest secrets, gaining mastery over the genetic foundations of life itself.

From Washington to Rome to Mecca, when Earth's theists learn of the Lunarians meddling in human genetics, they denounce them as abominations. Prince Ahmed Mohammed Al Zargowi, Caliph of the Islamic Brotherhood, believes he can use this hostility to bring an unbelieving world under Sharia Law. He unleashes forces intent on destroying the Republic before it's a half-century-old.

About the Author:

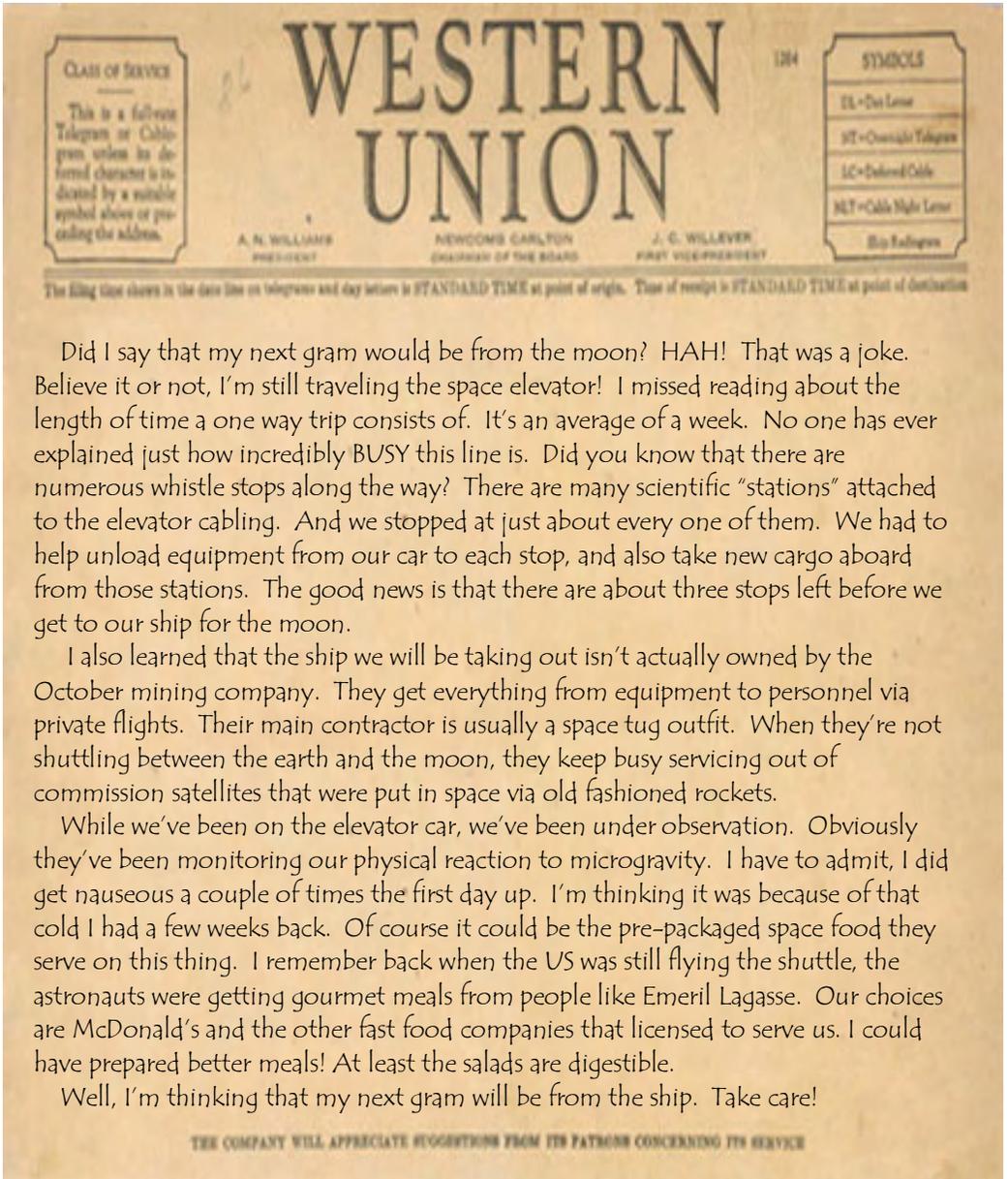
Charles Leshner holds a BS in Engineering Mechanics-Aerospace from the University of Wisconsin-Madison and an MS in Materials Science from Arizona State University. Charles is a lifetime member of the Freedom From Religion Foundation and an active member of the Humanist Society of Greater Phoenix. He also volunteers with the National Space Society and the Moon Society advocating colonizing space as the answer to many of the most pressing problems humanity faces today. Contact email: chuck@charleslesher.com

Charles is married to a wonderful woman. They live in a modest home in Chandler, Arizona. He is the proud father to her three kids and five grandkids, all living within a few minutes' drive time. Family means everything! Join Charles on his [facebook](#) page.

Letters Home

Dear Diary

12/24/28: Tomorrow is Christmas. I haven't been writing like I should. Busy and just didn't have anything to say. People die and the work goes on. I am now the oldest miner in my squad.



Did I say that my next gram would be from the moon? HAH! That was a joke. Believe it or not, I'm still traveling the space elevator! I missed reading about the length of time a one way trip consists of. It's an average of a week. No one has ever explained just how incredibly BUSY this line is. Did you know that there are numerous whistle stops along the way? There are many scientific "stations" attached to the elevator cabling. And we stopped at just about every one of them. We had to help unload equipment from our car to each stop, and also take new cargo aboard from those stations. The good news is that there are about three stops left before we get to our ship for the moon.

I also learned that the ship we will be taking out isn't actually owned by the October mining company. They get everything from equipment to personnel via private flights. Their main contractor is usually a space tug outfit. When they're not shuttling between the earth and the moon, they keep busy servicing out of commission satellites that were put in space via old fashioned rockets.

While we've been on the elevator car, we've been under observation. Obviously they've been monitoring our physical reaction to microgravity. I have to admit, I did get nauseous a couple of times the first day up. I'm thinking it was because of that cold I had a few weeks back. Of course it could be the pre-packaged space food they serve on this thing. I remember back when the US was still flying the shuttle, the astronauts were getting gourmet meals from people like Emeril Lagasse. Our choices are McDonald's and the other fast food companies that licensed to serve us. I could have prepared better meals! At least the salads are digestible.

Well, I'm thinking that my next gram will be from the ship. Take care!

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

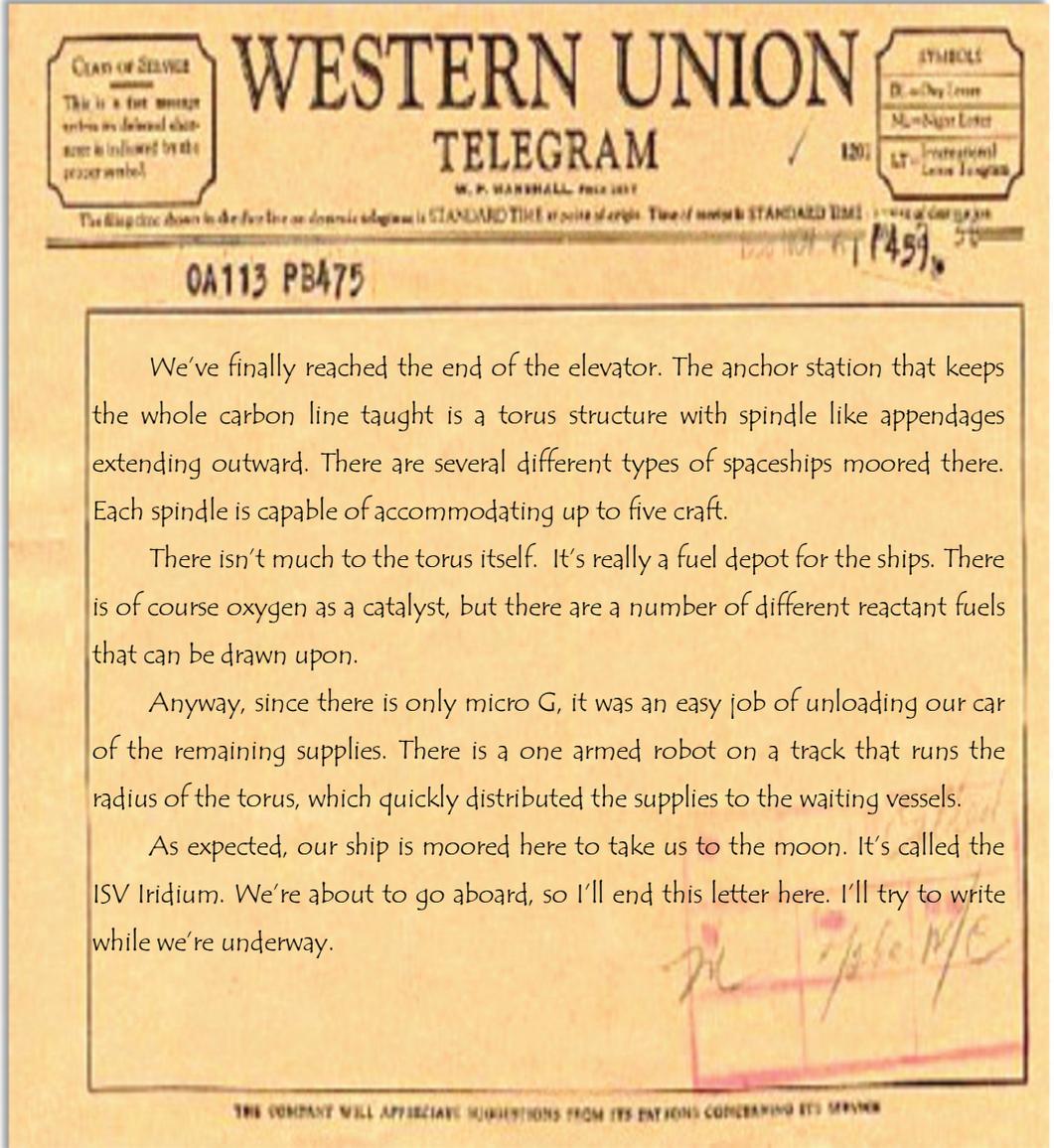
Ten Commandments

By Consensus



Moonflight

By Joe Nickence



Tom Montgomery and Silas Pak had just arrived at the end of a two-week space elevator ride. In order to afford that part of the trip, they had to help load and unload freight and experiments at each location on the “carbon ribbon line”. They were on their way to an outpost on the moon called October Moonbase, located in the Bee crater in the Mare Imbrium plain. A small mining corporation digging dirt to be converted into lunar concrete blocks, it wasn’t much by current standards. Tom was going to be a site inspector, and Silas was to be a chef in the kitchens. The jobs didn’t pay much, but it got them an adventure to the moon for a year!

The place they were in was called Counterweight station. It was mostly just a depot for a dozen small ships that darted back and forth between the moon and earth. It was a torus ring, with lots of tanks and hoses and experimentation racks. But it served its purpose in saving on the cost of refueling further down the line. The boys were looking for their next transportation, the Iridium. Back on earth, they were told it was a ship automatically run by robots. Tom was looking forward to observing how the bots actually performed this duty. But they were both taken by surprise when reaching the craft; they found two women helping to load the ship. Tom spoke first.

“Hello! Are you part of the station help?” The girls looked up at them briefly.

“No, we run the Iridium. I’m Mariah, this is Ashleigh. Chip is inside stowing the cargo. I’m guessing you two are the guys for October?” Silas spoke next.

“Uh, yeah. You’ll have to excuse us, but we were told that we’d be on a robotic ship. We weren’t expecting, uh...”

“People?” she finished. “Yeah, October management gives us grief about that a lot. We keep telling them it’s automated, not robotic. There’s a fine line, you know?” At this point Chip appeared

in the hatchway.

“Ah, so there are robots on the ship?” asked Tom.

“Humph! I’m hardly a robot” replied Chip. “This ball shaped machine is my preferred form when I’m aboard the Iridium. I heard your conversation and decided to get out here and meet you two ‘humans’ and help correct the misunderstanding.”

“I’m not worried,” said Mariah. Let’s get inside and underway, okay?” The group floated through the hatch in single file.

The first compartment they entered was typical engineering design. There were four racks that can hold experiment trays. Behind these were installed extra tanks that can hold various fluids that are destined for different space stations between the earth and moon. One set of racks was left purposely empty to accommodate bulk packages. These were secured with a closely knotted nylon net attached to the ship’s wall. It was similar in weave to a string hammock. The Iridium could carry just about any cargo that was presented to it. Twelve volt LEDs illuminated this area.

Tom asked “Is the whole ship like this?”

“Well if we were gluttons for punishment, it could be. This deck can accept most business we contract. Stuff like scientific experiments, and also supplies destined for the different outposts and stations we service. But since we also carry passengers, we needed to have a compartment that was more accommodating. That’s the next deck down, where we’re heading now.

As Silas and Tom were floating through the passageway between decks, there was a lot to take in. The next deck was the difference between night and day. Nets, ropes, racks, and latches gave way to something vaguely Victorian steampunk-ish.

“Wow” was heard in unison. Ashleigh smiled with a response.

“I’ll bet you were looking for HAL 9000.”

“Well, yeah. We’re looking for deep space mechs on a completely automated ship. And so far all we’ve seen is a robot basketball and two good looking girls!”

“Yeah, we’ll try to remember to explain that before we get to October Moonbase.”

The boys were shown their sleeping arrangements. There were six bunk capsules lined end to end, stacked two high. They were similar to Japanese hotel capsules, except they were open on the sides instead of the ends. This half deck was open to the command deck below. The kitchenette was located directly underneath them. All the walls were covered in an oak wood paneling.

Silas asked “I thought wood was weight restricted?”

“It still is. These panels are plastic view screens four millimeters thick. It’s a nice illusion, huh?”

“Yeah, it is!”

Mariah called out from below. “Get those two stowed so we can strap in for acceleration.”

“Copy. Silas, your bunk is number three. Tom, you’re number four. They’re both uppers. You’ll need to be down here and in the chairs in five minutes. Copy?”

“Copy!”

Shortly, the two boys drifted over the bunk deck railing rather than through the passageway. They found Mariah in the center chair facing the screen, Ashleigh on her right.

“Take the chairs along the walls.”

As they clicked the seatbelts a small square in the view screen turned green. Chip spoke.

“Acceleration in three, two, one...”

A vibration started in the floor below them, and suddenly everything went right side up as the temporary effects of pseudo gravity kicked in.

“There’s no chickening out now” thought Silas. Even though both men had the basic training, Tom sat quietly, gripping the armrests. An actual spacecraft had chucked all of his ‘I can handle this’ confidence out the airlock. The procedure was quite smooth, but you couldn’t prove it by these gringos.

As the burn continues, Silas switched his focus from his own queasy stomach to the girls piloting the ship. He thought they were strangely quiet. He could understand Chip’s silence. But Mariah and Ashleigh should be doing flight cross checks.

“Maybe they’re silent messaging each other” he thought. The muffled vibration and numbers scrolling on the screen were the only confirmation of activity. He looked at Tom. He was pale.

“Are you okay, buddy?”

Tom turned to him. “I hope so. I sure as hell wasn’t expecting this!”

Abruptly, the vibration stopped. Chip jumped up, retracted his legs, and went into hover mode. The bot was the first to speak to the passengers.

“The effects of pseudo gravity will only last a few more minutes. You can unbuckle your belts now.”

The captain and engineer were still quiet.

“Are they alright?” inquired Tom

“Yes, of course. You, on the other hand, look like you can use some antacid. It’s in the upper middle cabinet in the kitchenette next to you. By the way, the WC is on your right. Make sure the suction is on.”

Tom carefully rose from the chair, and gingerly floated to the

toilet. Antacid was not going to cure what he was suffering from. Silas stifled a smile.

“He’ll deny it, of course, but he hurred after the centrifuge test as well.”

“His bio didn’t say he suffers from space sickness. Will we need to make special arrangements?”

“Nah, he just got lulled into a false sense of gravitational security from the elevator’s constant acceleration. Very little vibration.. He’ll settle down into a routine.”

Mariah was the first to leave her seat and speak.

“So what did you boys think of our departure?” Tom was overheard being sick. She continued. “Okay, that’s one opinion. What about you, Silas?”

Well, now that we’re on our way, it was kind of exciting!” he gushed. Ashleigh now joined the conversation.

“The automation procedures make it fairly straight forward. The fuel mix actually cooperated for a change.” Silas looked at her. “Isn’t it always the same?”

“The numbers crunch differently from each tank refill. It would be equivalent to octane counts from fossil fuels from different refineries.”

“Ah, okay” was all he could manage. It was a typical deer in the headlights response.

Ashleigh just smiled at him. “Hey, is anybody hungry? I’m famished!” According to ship time, it was mid-day. “It’s my turn to cook. I’m nuking spaghetti for everyone.” Tom suddenly realized he hadn’t eaten in almost twelve hours.

“Hey, yeah, I could use some dinner! What kind of sauce is it?”

“I dunno. It’s something from Russia. We’ve had it before, though, so it’s pretty good.”

“That sounds good. Count me in!”

Eventually Tom emerged from the WC. He was no longer green, but he wasn't exactly up for a meal. The trio at the table looked at him, and decided not to mention anything about food.

"I think I'm going to bed. Do I need to take a turn at any kind of service watch?"

"Not really" Mariah replied. "The ship runs itself after we've set coordinates. We monitor everything from our augs."

"Augs?"

"Our augmentations. Ashleigh, Chip, and I can keep track of everything simply by visual and voice commands."

"How do you do that?"

"Ah. I've been waiting for that question from one of you. Watch!" And with that Mariah turned to Ashleigh. Without either uttering a word, the engineer shifted her view from the captain to a spot on the faux paneling. That spot immediately shifted from a wood grain to a viewing monitor, showing scrolling statistics.

"Cool!" Both Tom and Silas exclaimed.

"This is my engineering info on ship's systems" said Ashleigh. Depending on which system I want stats on, I'll simply follow the color coded text." On another panel next to hers, a male avatar appeared. It was Chip the robot.

"Hello, gentlemen", he said. "As you can see, I do occupy other forms. Some are electronic, some are mechanical. I serve in my capacity as ship's communications officer. I'm constantly monitoring thousands of internet and intranet channels. We knew exactly when you boarded the elevator line, each stop you made, and when you arrived at Counterweight station." And finally another panel converted showing trajectory data between the station, the ship and Luna.

"This is just some of the data I monitor as captain and pilot"

said Mariah. “If we drift by just a centimeter, I need to activate the flight controls to do course corrections.”

“So if you guys use the wall panels for data, what’s the big screen in the middle for?”

“Heh. That’s our television. We don’t like to overwhelm our passengers in the first hour. Now watch this.” The walls of the entire cabin switched from wood paneling to a rich green Irish hillside with beautiful blue skies. Birds were singing, and you could hear a brook babbling in an artificial distance. It was as though the crew had an outdoor living space. Needless to say, both men were speechless. Mariah continued.

“So you see, this ship isn’t just a ship. It’s our home. We travel between the moon and earth as part of our jobs, but we don’t need to feel like we’re cooped up in a tin can all the time.”

“So you can simulate any place you like?” asked Silas.

“Any place, any planet in SolSys, any timeframe imaginable.”

“Kind of like Star Trek’s holodecks.”

“Almost. Their tech allowed physical movement simulating linear distance. We’re confined to the interior diameter of the cabin.”

“Okay, I can accept that” said Tom. “So why is there carpeting on the floors? So you don’t bump yourselves when floating in freefall?”

“Nice guess, but no. You’ll find Velcro slippers in your bunks. Sometimes we need them just to keep ourselves oriented between up and down. The hooks in the soles of the slippers engage the loops of yarn in the carpet, keeping us attached to the floor.”

“And that would explain why you are still standing on the carpet while I’m floating away. Got it. I’m off to bed. See you at breakfast.” And with that, Tom drifted up and over the rail, entered his bunk space, and closed the sliding door.

When Silas had finally turned in, he was pretty well bushed. When he awoke the next day, he found that he hadn't secured his sleeping bag properly, and was hugging the opposite wall of the bunk. Or was that where the bag was supposed to be attached to? Looking to his right and left for the sliding door, he got his bearings. Then he noticed what it was that woke him up. He reached and shut the alarm off on his phone which was nestled in an elastic band above the door. "Lights" he called and two LEDs came on. Mariah's voice was on a speaker.

"Are you awake yet, sleepyhead? Tom is looking to have your breakfast if you don't get out here!"

"Yeah, yeah. Let me get dressed, and I'll be there."

After ten minutes passed, Silas was floating through the laddered passageway. The captain and engineer were finishing up their rations as Tom was beginning to reach for Silas' food.

"Well, I see you got your appetite back" quipped Silas.

"Dang, you were supposed to take another five minutes!" retorted Tom.

"Well surprise, surprise! What did you leave me?"

"Scrambled eggs and sausage. It was almost just eggs!"

Silas secured himself to the table and Velcro'ed his tray in front of him. It was even still warm! He slid open the zip locked pouch, retrieved the plastic ware, and skewered a fork full of eggs.

"The recycler is located in the counter next to the WC" called Ashleigh. We just had a new consignment of nanobots installed. Breakdown time has been reduced by almost a third of what it was when we got the ship!" Tom unfastened from the table and dumped his garbage into the recycler. Silas finished shortly after and did the same.

Looking from the table towards the command chairs, the crew had the cabin walls configured as a planetarium. Faux wood panels from the floor up to about waist high gave way to open space. You had the effect of flying from an outdoor deck. There was Mariah and Chip plotting a course of action using basic geometry graphics to station Charlie 03659. This was mostly a communications satellite, not much bigger than the Iridium itself. A week and a half ago a man got dropped off for its six month maintenance checkup. The ship was carrying a replacement component for 03659's navigation system.

One of the view panels was acting up, so Ashleigh was in freefall, working on that. "How's that coming, Ash?"

"We've got a loose wire, somehow. It must have vibrated off the connector. I've just crimped it, and I'll get it back in place in five."

Tom asked "So what's going on here?"

"We're in the orbit of C03659. We've got a circuit board for it from Texas Instruments for its aft gyros. Would either of you boys want to suit up to make the delivery?" said Mariah. Tom and Silas looked at each other, not sure whether to jump on the offer or not. She just smiled.

"I'm joking! We can dock with the pod easily. Ashleigh is going over to help the tech that's already there. You'd probably install it upside down!"

Tom breathed a sigh of relief. Silas looked at him and said, "The helmet probably wouldn't fit that swollen head of yours anyway!"

Once the ship and satellite were mated, things really got busy. Mariah was downloading the satellite's current status while the guys were watching on the main screen. Ashleigh was in the cargo

compartment with a sealed case, drifting through the lock to C03659. The tech there was a man named Alex. They hugged.

“Ashleigh! How’s that leg acting up?”

“Well, Alex, once that joint software was reinstalled, it got much better.”

Tom and Silas looked at each other. Mariah gave them a sideways glance and resumed watching the banter.

“Hey, Alex, how’s that app working out in the travel pod?” Chip asked.

“Really great! My reaction times are much more accurate now that it double checks my patterns.” Mariah again looked at Tom and Silas and explained.

“Chip wrote Alex some code to help him out with his work pod. One time we were lucky enough to be close to answer a distress call from him when his pod’s arm unexpectedly gave way when he was transferring supplies from a shuttle to a lander. There was just enough spin that would have had him crashing on the moon’s surface.”

“Ah!” and “Wow!” they replied. Alex continued. “Mariah, your ava-“

“Whoa, Alex!” Mariah interrupted. “We’ve got passengers here that don’t need to hear that. You can tell me later!” Alex was seen blinking at the camera, as though he could see into the ship at the boys. “Oh! Okay. It’s time to get this baby installed anyway.” He and Ashleigh floated a short distance off camera. Then another was activated where they arrived. But it was merely a procedural activation. The group grew quiet and about an hour into the visit, the board was installed and tested. All conditions were positive. So both Alex and Ashleigh came through the hatches. They were to return Alex back to the moon. Another guest for dinner!

“Uncoupling in three, two, one.” The satellite appeared to float away from the ship on screen, but it was they who were departing. C03659 adjusted for action/reaction, and resumed its orbit. “Next stop is October Moonbase, gentlemen”, said Chip. “Awesome!” said Tom. He was instantly pumped with the prospect. But Silas only managed a calm “cool”. He was really enjoying being on the Iridium. Especially with the company of Mariah, Ashleigh, and Chip. He had learned more in two days on the ship than he would probably ever pick up on the station. And there was only a single day left on board.

“How much longer until we get there?” asked Tom.

“Current projection is eighteen hours”, replied Chip.

“What company are you boys with?” asked Alex. He had just changed out of his flight suit, and was washing for dinner.

“We're under contract with October Mining”, said Tom. “We both were selected about a year ago.”

“Excellent! What positions?”

“Silas is a cook and I'm maintenance.”

“I assume for the standard yearly duration?”

“Yes.”

“Then I'll have to watch for you boys in my visits there. I'm normally in the town in Bancroft crater, which is northeast of Beer crater. You'll probably get there from time to time as well. We share supplies.” A ping from the kitchenette signaled dinner was ready. Beef stew tonight!

Silas' phone alarm went off. It was 6 am, ship's time. One or two others were still asleep, judging from the muffled snoring. At least he had remembered to fasten his bag to the capsule correctly this time. Dressed and exiting the capsule, he found Mariah about

to descend to the flight deck. “Hey, wait up!” he called to her. She turned and smiled to him as she floated down.

“Did you just get up?” he asked her, as he did a 180 to land on his Velcro slippers.

“Nope. I've been doing cross checks for about a half hour in my bunk and chatting with Chip and October Moonbase. Our ETA is six hours. Breakfast and lunch here on the ship, then we get to experience your cooking for dinner! I understand that you've already sent in your menu for tonight.”

“Yep. Tom and I have been getting updates and briefings since we've been on the elevator.” Silas looked around for Chip. He was normally present like a loyal puppy whenever anyone was on the flight deck.

“Where is Chip?”

“He's recharging. Or sleeping, depending on how you look at it. Actually, the machine is recharging. He's been virtual most of the trip. So have I.”

“Huh?”

“Oh, that's right! We were going to tell you boys about that, weren't we?”

Ashleigh, Tom, and Alex were now joining them around the table in the kitchenette.

“Ashleigh, would you like to start?”

“Sure!” She rolled up the right sleeve of her blouse, took her arm, gave it a counter-clockwise twist, and removed it from her shoulder. Tom and Silas were both completely surprised. Alex just smiled. He already knew all this info. He'd seen the show a few times before. Next, she unbuckled her pants. The boys eyes went wide. But this was not a strip show. Ashleigh reached to roughly where her navel should have been, and with a small suctioning sound, her torso separated from her hips. As what was left of her

floated away, she gripped her mechanical lower half with her natural arm as the right prosthetic arm took a life of its own and attached itself to the cavity where her torso was.

“I’m classified as sixty percent cyborg. I’m actually a Siamese twin. My sister’s name is Sabrina. She had the full body, while I developed off of her hip. After the surgery, She grew up “normal”, while I went through a series of prostheses. When I actually go to earth’s surface, I need to remove the arm, otherwise gravity would pull it off. My torso snugs into the hip cavity of my walker prosthetic, so that’s not a problem.”

“Alex, would you do me the honors?” asked Mariah.

“Certainly!”

He gently floated behind Mariah, reached up to her neck, and touched a small spot at the base of her head. She stiffened upright, pulled her arms to her sides, and for all appearances, looked like she died. Now the boys stared at her.

“Hey, over here!” A set of wall panels had activated. There stood both Mariah and Chip, looking very much alive. Both were dressed in bathing suits. And now the entire cabin converted into a location of beachfront somewhere in Hawaii. You could almost smell the saltwater.

“Smell-o-vision”, Ashleigh smiled as she was reassembling herself. “It’s still a hit and miss technology. This time it worked.”

“You’re, you’re a ...” Tom stammered.

“A robot. A droid. Actually, a gynoid, if you use the Japanese explanation.” Mariah finished for him. Tom and Silas quickly looked to Alex. He raised his arms and smiled.

“No, I’m quite biological. The closest I am to cyborg is a neural implant in the back of my neck. I’ve known the kids for years. But they’re all very much human.” He once again touched the spot on

the back of Mariah's neck, and with a silent boot up, she appeared as though nothing had ever changed. She looked over to her avatar form on the screen and said "We'll sync later." The walls changed back to oak panels as Chip the basketball bot floated over to them.

"Mariah and I are originally first generation AI code from back in the early post Singularity days", Chip said. "I tried using a humanoid form in physical reality, but found it too complex. This sphere is much easier to maintain."

"And I have always used a humanoid form. I tried both male and female types, but I prefer to be female", said Mariah. The boys were recovering from the surprise now.

"So THAT'S why we were told it was a robotic ship!"

"No, it's not", Mariah corrected Tom. "The Iridium is very much an autonomous ship. Her human crew just happens to be mechanical in form. I'm as much human as you are."

"So how are you able to eat?" asked Silas.

"My digestive processes are part of my mechanical power functions. I'm not going to explain it to you now because it's too complicated for the time we have left together. Speaking of digestion, I'm hungry! Let's have some breakfast!" Everyone laughed, Tom and Silas the loudest. This had been an amazing trip.

Landing the ship on the surface had been uneventful. The pad was just a dozen or so meters from the entrance of October Moonbase. Now that there was 1/6th gravity, everyone had to use the ladder to get up to the bunk capsules and down again. Mariah and Ashleigh stood below as Tom and Silas tossed their bags over the rail for them to catch. Procedure was to suit up in case of accidental decompression, but in all the years that October was in place, there was never an accident. They had a special rover that jacked up to the ship's pedestrian hatch, and locked in place. The

ship's complement boarded the rover, and docked with the station's entrance. Chip stayed behind, opting to be virtual on the moonbase. He had the job of directing the station's bots in unloading the supplies.

Later that night, Silas and the other kitchen staff cooked for the entire station. It was a scrumptious meal of re-hydrated chicken, beef, and vegetables. Tom wasted no time in getting to know the layout of the station with a new female engineer. He said his good byes to the crew of the Iridium and hurried out of the dining room. Silas came out of the kitchen, wiping his hands, and took a seat with them.

“Will you be staying in the base tonight?” he asked.

“No, we'll be on the ship. We have to get the next stop ready for tomorrow.” said Mariah. Alex and Ashleigh looked at each other. Without either of them saying a word to Mariah, they said their good byes to Silas and left the dining room as well.

“You know, you and Tom have been the first two people that haven't been totally repulsed by Ashleigh, Chip, and me. We've done that performance so often, it's almost required of us. Almost like we're still trying to prove ourselves as humans.” she said.

“Well, not to be insulting, but I've always fancied that I'd date a female robot someday.” he replied. He suddenly felt himself blushing. She chuckled at him.

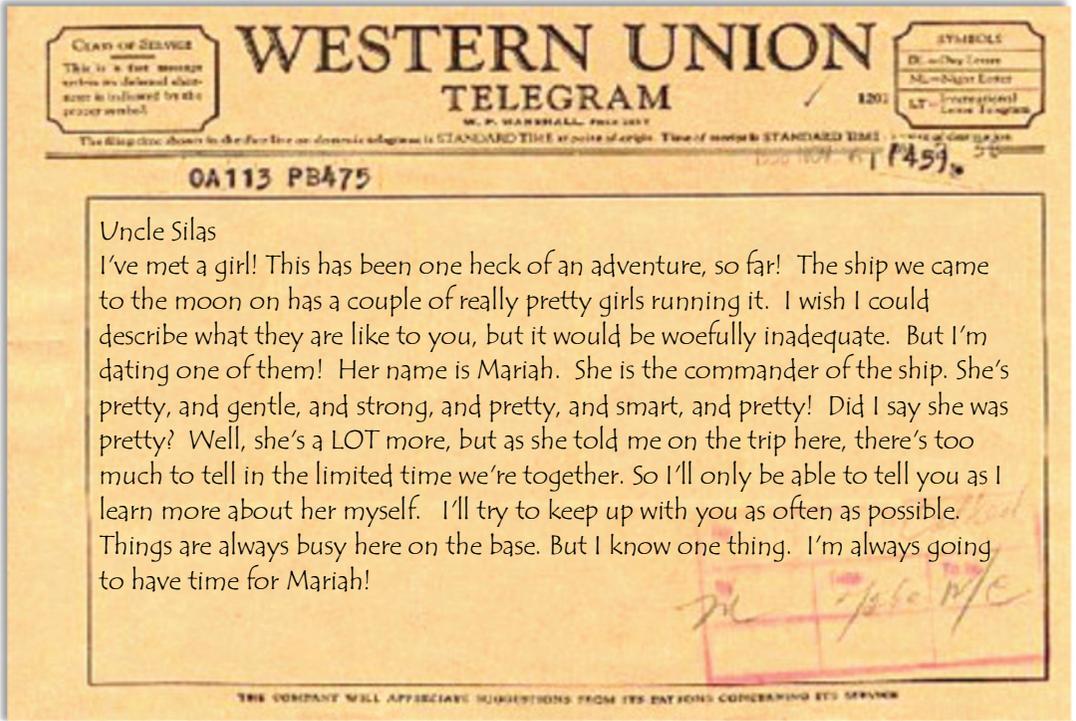
“We'll be here at October about every other month or so. Can I hang out with you?” He looked at her with total surprise.

“What about you and Chip?”

“Some day when you understand virtual reality a bit better, I'll explain that to you. But in physical reality, people are still put off by me and Ashleigh. And as you saw, Alex is dating her.” At this point, Silas leaned over and kissed Mariah on the cheek. It was warm to his lips. It felt good. It made him all tingly inside.

“On one condition”, he said. “When my year is up here, I’d like to come on board the Iridium with you.” She looked at him, and smiled. Then kissed his cheek in return.

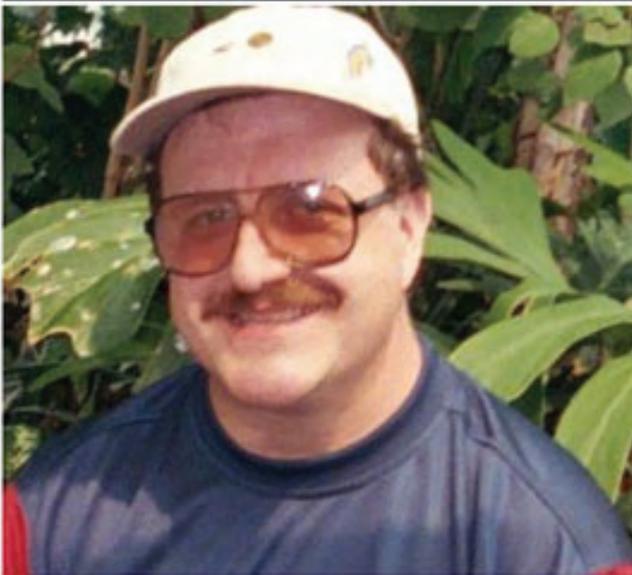
“You got a deal, mister.”



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Having reached the half century mark, Joe has settled down to wait for the Singularity. Ever feisty and opinionated, he visits web pages, news sites, and blog posts to expound on the wave of the future. He has tinkered with model railroads, toy robots, and a plethora of past-their-prime computers. An avid science fiction reader, he lives in Gladstone, MI with his wife. They just celebrated 25 joyous years together.



Submissions Guidelines

Moonbeams preferred genre is Science Fiction as it relates to colonizing space and the moon but we will accept other genre including nonfiction. You do **not** have to be a Moon Society member to submit.

Moonbeams is about two things: authors getting their work published, and making the case for space colonization

Successful submissions must stick to accepted physics: no faster than light warp drives, no worm holes, no time travel, no transporters a la Star Trek and no alien monsters. No magic, no fantasy. Last but not least, no social, political, or religious diatribes. Send us a plausible story about the colonization of space and the moon and we will publish it. But don't stop there. The subtitle "Tales from the High Frontier" indicates that stories can be set anywhere in the Solar System. Nonfiction submissions on science and technology must be thoroughly referenced.

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The Editor