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A MATTER OF SOME GRAVITY

by

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For many people, being cooped up within the confines of a small cargo vessel for weeks at a time would be a nightmarish existence; for the crew of the *Corpus Georgi*, it was almost life at its finest. Captain Sarah Rhodes and pilot Zane Waterman had had their fill of excitement and adventure and bore the scars of it. A quiet life appealed. And nothing could be quieter than a well-run cargo ship in hyperdrive.

In earlier eras, an uneventful crossing would have kept the crew of a ship busy: cleaning, painting, maintaining. But those days were long past. The ship was perfectly capable of maintaining itself, and in fact George - the ship's avatar - would become quite irritated at anyone who tried to clean his decks. This meant that the crew of the ship was free to pursue their passions. This included immersion in virtual worlds, exploring, experiencing and gaming. Even the four-armed Thessi Loff, the only other organic member of the crew, would spend much of his time plugged into the system, exploring the history of humanity and examining the known universe. His people had never developed this sort of technology and generally shunned it, but Loff found it fascinating.

Even with whole universes to explore in their heads, only a fraction of the day would be spent "navel-gazing," as Zane called it. Mankind had come close to disaster numerous times due to over-reliance on computers and the fantasies they provide; society had learned at high cost how to moderate such

behaviors. So the crew also spent a great deal of time talking, or reading, or, in Zane's case, watching the hyperdrive in action. It was not an exciting thing to do... there were no moving parts, no flashing lights or weird effects, just a solid machine that didn't seem to do much except take energy from the fusion reactors and - somehow - convert it into linear acceleration in hyperspace. Nobody really knew how the hyperdrive worked.

With few occupations needing humans, and few humans needing occupations, most people spent their time pursuing their hobbies. As it had been since the invention of electronic entertainment, most people devoted their time to passive entertainments or synthetic immersions. It was rare for someone to have a hobby that involved building physical items. This rareness was what made them valuable.

Zane had tried his hand at a wide range of constructive hobbies, from whittling bits of wood to sculpting in clay to sketching and painting... and had found he had no talent for it. After considerable effort he could make something that looked pretty much like what he wanted, but the results would win no prizes. His most recent efforts were in the relatively new field of gravity sculpting.

As the *Corpus Georgi* was a cargo starship, it not only had to be able to maneuver heavy objects around the cargo bay, it also had to be able to protect the interior from high or sudden accelerations. The first was easy, comparatively... adjustments of the gravity plating in the cargo deck would vary the weight (though not the mass) of the cargo, and simple bots could shove it around. Countering unpleasant or downright dangerous accelerations, however, required far more precision: the vast arrays of grav-diodes in walls, floors and ceilings adjusted the internal gravitational field on a nanosecond timescale. This, of course, was one of George's main jobs. And as far as most people were concerned, it was a system that required no second thoughts... or even first ones. The science behind gravity manipulation was

centuries old, but far beyond the understanding of all but a few. And the complexity of the system, requiring the fine control of several million grav-diodes per square meter, meant that most people never even tried to figure out the dynamics of these systems.

But some had tried, and found that interesting things were possible. Trained AI's could, with minimal effort, create any gravitational field they wanted within the confines of a starship. Humans, though, could not with any finesse. It was simply too complex for humans to try to independently control with any standard input device. Gravity field manipulation on a coarse scale was often accomplished by wearing special sensor/transceiver gloves with considerable AI assistance... this was often done for moving heavy items throughout ships. But it was a crude process adequate only for cargo movement.

But then someone tried a more direct approach. Nanobots threaded fine sensor/transceivers throughout an early volunteers hand and linked the network into his nervous system. With it in place, he could *feel* the texture and topography of a gravitational field with a depth and precisions far beyond what the earlier gloves had provided. And by proper gestures, or even direct mental inputs, he could cause the myriad of grav-diodes to adjust the field, creating eddies and currents, sudden reversals, points, lines and sheets of intense gravitational attraction. It was, essentially, the age-old dream of telekinesis, achieved via technology and artificial gravity rather than magic or superpowers. With further understanding of just what could be done, the art of gravity sculpting was born.

One early morning an hour before Sarah would normally wake, Zane sat in the starship's wardroom. On the table in front of him was a just-fabbed bucket of what might be mistaken for water: a clear, colorless, runny liquid polymer. He closed his eyes, took a deep breath and fired off a mental

command. He felt an indefinable "click" as systems within his hands and nervous system switched on and linked in to the ships gravity generators. He waved his hands slowly before him, like an old-timey fantasy wizard, getting the lay of the current gravity field. Right then it was fairly flat... pretty uniformly 9.81 meters per second per second, oriented vertically toward the floor everywhere in the room.

"You sure you want to do this?" George interrupted, with a clear note of disdain. "You're not at all good at it."

"You learn by doing," Zane said, quietly, eyes still closed. "I've only been at this for a few weeks, so bite me."

George had several retorts ready to go, but in the end decided that he just wasn't that interested in sparring.

Zane slowly stood. With a wave of his hands the tables and chairs slid aside leaving a clear space in the middle of the room; the bucket hovered in mid-air, quivering slightly. The surface of the liquid bowed in at the outer edge, pushed out in the middle, attaining a partially spherical surface.

Zane opened his eyes and looked at the bucket, satisfied. With a thought, he locked in the field surrounding the bucket, then concentrated on a spot of empty space a meter up and a meter ahead. The gravity field began to push in on itself right there, forming a point attractor of considerable power; at the center point, the gravity was nearly 10 gees, falling off more or less spherically down to one gee a few centimeters away and blending into the background field half a meter out. With a twitch of his hands, a gravitational ribbon opened between the bucket and the point attractor. The clear fluid simply poured up out of the bucket and toward the attractor, wobbling and sloshing. The empty bucket drifted to the floor.

Zane steadied the blob of fluid, settled it into a steady sphere. There was just the hint of a vibration on its surface, a quirk he had so far been unable to overcome. No matter: he began to gesture. As he did so, the fields

shifted, squeezed and stretched. The fluid began to branch outwards, flowing down the gravitational inclines he was creating.

As the polymer began to transform from a sphere into something resembling a fractal bush, Loff wandered by the wardroom. He was not a morning person, and was quite bleary; and he was taken aback by what he saw floating in midair. He hadn't seen Zane attempt gravity sculpting before. He was astonished enough to stop and silently watch from the open doorway.

Zane continued to gesture, but more quickly, spasmodically. Sweat began to bead on his forehead; the bush pulsed, expanding and collapsing, appearing more and more chaotic. Things were not going quite how Zane wanted. He had entered into what he recognized as "pilot induced oscillation," where things start to go wrong and his inputs to correct them just make things worse. It is often enough unrecoverable. And so it was here: droplets of the polymer began to escape his control, spattering around at high velocity.

"Gah," he muttered with a growl, clapping his hands together. This caused the gravitational field in the middle of the room to collapse in on itself, slamming the bush back into a sphere. With a glower, Zane held it there for a moment, then began to gesture again, slower this time. Now the blob began to extrude thick nodules, thin filaments, lacey membranes. He had better control, but it was too late: high gravity and sudden impacts caused the polymer to begin to harden. It was turning solid as he watched it; the harder it got, the harder the gravity fields had to work to mold it, and that only made it harden faster. Inside of ten seconds, it had wholly solidified.

It was not what he wanted.

"Shit," he muttered, looking at it hanging in the air. It looked like nothing so much as a mass of viscera... internal organs made from crystal, with veins and arteries looping in and out, membranous skins hanging off it.

His ability to make things with gravity was, evidently, not well developed. But he was skilled at simple movement; he drifted the mass slowly

towards him, finally taking it in his hands. Disconnecting from the gravitational control system with a mental flick, he turned the piece over and over, scowling in dismay at his creation.

"So," George said at last, "what's it supposed to be?"

Knowing full well what was coming, Zane muttered, "It was supposed to have been a bunny."

"A bunny, huh. Wow. You suck."

"Cram it."

Loff knew most terrestrial species, including several types of rabbit. He was well aware of what a bunny was supposed to look like... either a realistic rabbit or something cutesy from entertainment vids. And what Zane was holding looked very much unlike a bunny. Unless it was a bunny that had undergone explosive decompression. "Wah wah waaaaugh..." he blurted from the door.

"Kiss my ass" Zane announced. Sighing, he gave up on the spectacularly failed sculpture and walked it and the bucket over to a recycler slot in the wall. Down they fell, to be ground up and returned to basic chemicals and elements for future use.

As Loff wandered off about his morning business, Zane almost unconsciously switched the gravity control back on. With a casual wave of his hands, the tables and chairs slid back into place. He tossed himself down in a chair to try to ponder why he was having so much trouble with a simple sculpture of a rabbit. Nothing really came to mind.

Zane had studied the process long before he had nanoprobe seed sensor/transceivers throughout his hands. He wasn't one to have himself modified, even a modification as minor and unobtrusive as this, on a whim. But the process would make him much better at cargo movement at the very least. And it would, perhaps, provide him with an interesting diversion.

Sure, the process was said to be far more intuition than engineering; it was not like conventional sculpting. It was not a matter of adding or subtracting material until the object looked like what the sculptor wanted. Instead, it was a matter of forming the gravitational environment so that the object poured itself into the shape the sculptor wanted. But still, the difference between goal (a simple rabbit) and result (splayed innards) was inexplicable.

The great gravity sculptors all agreed that successful sculpting was more about emotion and instinct than a learnable process. None could say just how they did what they did, just that "it came to them." Many claimed that their best works came from when they were not actively focused on any particular design. Instead, pure instinct caused them to form shapes that surprised the creators, but which they claimed accurately mirrored their emotional states. Zane scoffed at that... gravity sculpting was simply a manufacturing process. Sure, the mechanisms were quite a bit different from the normal approaches, but there was nothing magical about it. Anything that could be done by one person could be done by another, with enough study and practice. And while he had neither the hope nor the goal of becoming as skilled as a professional gravity sculptor, he expected that he should be able at the very least to produce a sculpture that was recognizable for what it was supposed to be.

He ordered up another supply of the resin from the wardroom's fabber. But instead of a bucket, this time he only had it whip up a shot glass of the stuff. During the few seconds the fabber worked, Zane casually moved the room's furnishings back into place with an offhand wave. When the fabber "dinged" that it was done, he casually levitated the small metal cup with the dollop of resin over to one of the tables. He sat down in front of it and glared at it for a few seconds.

"Hmmmph," he muttered, and began to focus on the watery resin. With considerably more care, he concentrated on it; the resin began to slowly rise from the cup.

"Hey," Captain Sarah suddenly called from the wardrooms doorway, walking in and barely giving Zane a glance. She was up early, and was clearly not yet fully awake. She headed towards the fabbers to get her morning dose of coffee.

Zane quickly let go of the blob of resin, just beginning to rise above the lip of the cup. It dropped back into the cup with a soft "bloop." He snatched it off the tabletop and set it on the seat next to him, out of Sarah's sight. He didn't want her to see his ham-handed "art" until and unless it was something worth showing off. And recent efforts had been worth nothing more than the recycler.

Sarah, steaming cup of coffee in her hands, sat down opposite Zane. She looked at him drowsily. "You're up early," he said. Unconsciously, his hands fidgeted below the table.

Sarah grunted. "Couldn't sleep." Took a sip of her coffee.

Zane nodded. Sarah's nightmares meddled with her ability to get a good nights rest, sometimes; a problem Zane knew all too well. He looked at her closely, doing his best to appear as casual as possible. Apart from looking dog-tired, she seemed ok. Zane knew that there was really no need for worry, hadn't been for years, but still he cared. Long experience taught him that the best thing he could do was... well, nothing, really.

As Sarah drank her coffee, the caffeine worked its biochemical magic and she began to wake and perk up. At last she smiled, an honest smile that let Zane know that she had put the night behind her. She began to go over the days work agenda which was wholly normal in having almost nothing in it except some largely unnecessary routines. Zane nodded and grunted at the appropriate moments.

It was another two days in hyperdrive to the destination. Sarah had never been to this system before, and was excited about the reported wonders of the gas giant around which the destination world orbited. It was a place of vast auroras, lightning storms, moons and a wholly remarkable rose-pink atmosphere, quite unlike any gas giant she had seen before. She chattered at length about it and was clearly delighted by the prospect. Zane again said little, content to let her go on. Sarah rarely spoke at length about much of anything, and it made Zane smile to see Sarah so happy about something. And not for the first time he noted just how lovely she was, especially when she smiled. And he made sure to nod and grunt at just the right points.

Finally, Sarah finished her coffee. Standing, she mentioned that she was going to go wash up then head to the flight deck. Zane told her he'd meet her up there shortly.

Zane sat, lost in thought, after Sarah left. George, however chose to break the mood. "Hey, dumbass," he said over the wardrooms PA system.

"What," Zane sighed.

"You made a mess of your resin."

Zane winced as he remembered that he hadn't turned off the gravity manipulation system. "Gah," he muttered, looking over at the seat next to him, expecting to see a mess of spattered polymer. But instead, the resin was floating just above the seat, hovering in a fully cured solid state. With a scowl, Zane plucked it out of the air and held it up to get a better look at it. "The hell?" he muttered under his breath, peering closely at it.

Loff wandered back in to get his morning hot chocolate-and-watermelon smoothie from the fabber. On his way back out, he stopped in front of Zane and looked at the cured resin. "Did you do that?" he asked, squinting as he took a closer look at it.

Zane held the crystalline object by a delicate stem. "Yup," he said. "Seems so."

Loff nodded slightly. "Nice," he said seriously.

"Yup," Zane said. He had to admit it was pretty good, even though he had no idea how he had managed to create a perfect replica of a rose.