

# Where Gravity Sleeps

## 8 – Migration

The moon was unoccupied a few hours before Heccat struck the Earth. Everyone had already fled into the six bubbles. The bubbles were no longer in orbit in Earthspace either. Five months earlier they had begun their long journey to an orbit just inside that of Mars. The earthlifts delivered people to waiting spacecraft that then made the ever-increasing commute to the fleeing bubbles. Almost every available ship that was in Earthspace was shuttling passengers in the last days. The earthlifts could not be delayed if people were to be saved and the bubbles could not be delayed if they were to survive the aftereffects of Heccat.

Christopher Floyd was a member of the Outer Earth Survival Committee that included the Captains of the bubbles, their key engineers and staff, representatives of pilots and engineers from all three interplanetary shipping consortiums, and representatives from all of the major industries. They had convened on Floyd bubble, as a courtesy to “Old Man” Floyd.

They had confronted the problem of how to move the bubbles to a safe new orbit around the sun. They had formed a plan that called for the construction of a set of rigid pyramids. Each one was ten kilometers on a side and there was one pyramid for each bubble. The apex was attached to the large ring on the stationary end of a bubble opposite the spaceport. Luna Linda, which wasn't a Floyd bubble, still had a stationary end and a temporary towing ring had been attached there.

Each of the other three points of the pyramid structures ended in a harness which allowed a single interplanetary transport ship to be attached and used simply as one large thrustfarm. The harnesses allowed the ships to maneuver and direct their thrust as needed for maneuvering. The pyramids were large enough so that the energetic spray from the thrusters would miss even the large mirrorwings.

The bubbles needed to continue to rotate in order to provide gravity for the occupants, as well as to support the station's normal functions. Gravity was as much a part of the way the bubbles worked as the titanium with which they were made — a metal that came primarily from the Moon.

Maneuvering a rotating bubble was always very tricky, even for minor repositioning. A bubble was a tremendous gyroscope. So even when the interplanetary craft had set courses and began to pull the bubbles, they

remained in the same orientation, pointing endwise toward the sun. The enormous combined thrust from the three interplanetary craft translated through the structure and focused itself eventually as a monstrous side-load on the hubmouth bearings. The hubmouth bearings were deflector reinforced; they consumed energy to sustain their nearly perfect bearing effect. They consumed an astonishing amount of energy during the flight because they had to oppose the force of the powerful thrusters.

It had all worked and the bubbles were slowly pulled out of Earthspace at a steady 3/100G force. Now the bubbles were half the way to their new orbits. Already the sun was noticeably dimmer and smaller. What would normally be day reached only a weak twilight. At this very moment it was still a couple of hours before Heccat was predicted to strike the Earth. A string of ships chased after the bubbles, shuttling the last survivors of Earth toward their salvation. The earthlifts themselves left Earthspace and pursued the bubbles, even though the passengers had transferred onto smaller ships that had food and minimal accommodations. It was a hard time for anyone who left Earth in the last flights; nobody complained. Instead they wept for those left behind.

Now all eyes were on one of dozens of real-time holographic images of the Earth, broadcast from the few research craft still in Earthspace. Every available telescope was aimed back toward the Earth, which was only a pale bluish-white dot of light to the naked eye. It was a small but visible blue disc even through low-magnification visionmasks.

Ian, Helen, and Athena Macbeth sat and watched silently in an auditorium in the CSSI remote campus on New Eden. It was now only ten minutes from when the awful event would really happen, but it would take an additional 130 seconds from the moment of the event for the light from the collision and the science ships' signals to reach the bubbles. The room was mostly quiet now. Many people were openly weeping. Helen had her arm around Ian's shoulders and Athena was in his lap, looking around at everything. She was about eighteen months old now. Helen and Ian thought of their families and of Julie Rosen, who had given them the tickets that saved their lives. That gift would cost Julie her own life. They were not sure how it had been arranged, but they knew there was something unusual going on when they had been nominated and hastily approved for transfer to CSSI at New Eden. They would have been thinking of Dr. Highland fondly too if they had known how hard he had worked to make their transfer possible.

Now, like everyone in the bubbles, they were silent and they watched. Some people prayed. The lights everywhere in the bubbles dimmed noticeably at the precise moment when Heccat struck the Earth. It was a sign that people instinctively understood. It was like flying a flag at half-

mast; it was the drum roll before the revelation. People barely breathed. Many spontaneously began weeping or outright crying. Some wailed.

There were over two minutes of heart-pounding anticipation in which minds struggled to comprehend the event that must have already occurred and which they were about to witness. In those moments people supplicated themselves to whatever gods they thought might be able to prevent the calamity. Either the gods didn't exist or they didn't care to intervene. The truth raced to meet them now at the speed of light; no force in the universe could prevent the arrival of the information that comprised the entire direct experience the survivors of Earth would have with Heccat.

The lag between Earthspace time and bubble time had been increasing slowly since they left. It was never so poignant though as during those moments when people on the bubbles waited for visual and data confirmation of the fate they believed Earth had already met. It was a strange, uncomfortable pocket of time, like having seen the mad burst of fireworks, but not yet having heard the fearsome report. Every mind that could watch was watching and feeling the course of moments pass like a river just before a waterfall. Then they arrived at its edge.

On Earth, a few moments before Heccat arrived, a hapless trout had just been sucked over Vernal Falls and flew stunned through the chilly, predawn Yosemite air, trying to see or breath or get back into the water. If a fish could have a single creative thought to save its very life, now would be this one's last opportunity. Then suddenly there was no water, no place for it to fall, and no fish.

Everyone in the bubbles saw the Earth explode and continue to explode. The blue Earth turned orange-red from the inside and the atmosphere and oceans began to disappear into fiery black and orange. It didn't stop. It went on and on and on and on. It was terrifying and still it continued.

From a view near the axis of the collision, the Earth was suddenly pierced and space could be seen through the center of the planet, but only briefly. The rest of the planet exploded in all directions. Pieces, chunks and flows sprung out into space. The Earth died and the neobelt was born.

It was too much for many people and they put their heads in their hands, or closed their eyes, or wailed in anguish. Others were fascinated to witness such an incomparable event. Practically everyone in the bubbles witnessed from afar the death of their loved ones back on Earth. The moment of collision was horrible for every human everywhere — and would remain a terrible memory for everyone who survived. The twilight daytime in the bubbles mirrored the emptiness and loss felt by the people

surviving in them. It was a bleak moment for the survivors in the fleeing Outer Earth.

Ian and Helen took Athena out of the auditorium, out into the dim daylight. The young parents' eyes were wet with tears from watching the death of Earth. Helen looked through the windows to see the other bubbles. She felt like the entire human race was now contained in a few fragile bubbles of life. She looked back toward Earthspace where she could see the growing, red-orange explosion with her naked eyes. "All those people... gone. But, somehow, we're still alive." She said, letting Athena down on the grass to play. She felt the moment pass thickly and sweet, heavy as a heartfelt homecoming accented with a mortal fear.

Ian and Helen hugged tightly. They held onto each other for a while and watched Athena play on the grass. They smiled a little and then Helen said "But, I'm glad we made it. I feel so... useless though, like our survival was a precious gift and 'what are we doing with it?'"

"I don't feel guilty to be alive." He pointed to Athena. "We are doing something important." Ian spoke quietly; he was depressed like everyone else.

"Yea, that's true. I wonder what kind of life she has to look forward to now? Is she really going to live out her life in these... bubbles?" She asked in a distant voice. She looked around inside New Eden. It could not possibly be large enough, she thought.

"What else is there? The belt?" He quipped. They smiled a little and watched Athena play.

Helen looked through the bubble's windows at the limitless space around them. She felt very alone and very vulnerable. She pulled Ian near her. "Where's the Belt? Will you point it out to me?" She asked.

"I don't think so; it's too dark... and it's all spread out, you know?" He replied. Then he realized it wasn't a technical question at all. He held her with one arm and pointed with the other. He spoke softly into her ear. "There. And all around that way and that way — and completely around the sun. We can't see it, but it's there." As he described the belt it dawned on him perhaps for the first time ever how large an area the belt comprised. "It's a pretty big area, the Belt." He said. He ran his hand through her hair.

"There's people still alive out there... somewhere." She said quietly, searching the sky around her. She seemed to strain as if to see someone out there amid the harshly clear sky.

“Yea, thousands of people, I think. Uhhh, there’s a lot of industry out there I heard. And, I heard that there was some kind of inhabited cavern inside of one of the big asteroids. Doesn’t sound like a very interesting place to live. I’m glad we’re in a bubble.” He said looking at Athena.

“I wonder what they’re doing?” She asked.

Ian shrugged.

Just then Athena began to cry. Her crying was a sound that was uncommon in the bubbles. There were surprisingly few children or babies in the bubbles. It meant that there was an unlimited supply of baby-sitters and people to help with Athena. Ian and Helen enjoyed unusual popularity because of Athena. Helen comforted her and continued their conversation.

“I don’t know. Maybe they have a web we can tap into. Maybe we can find out what’s on their minds. Do you think you could get in from our console?”

“Well, if they have a public web then I don’t see why it would be difficult.”

“Let’s try.” She said and they hugged again. She felt better with something to do. Then they collected Athena and returned to their small apartment.

They were not the only ones to tune into the beltweb that evening. In fact, more and more of the bubble population began to be curious about the Belt. Some like Helen were curious to learn what they could about the last remaining survivors of Earth outside the bubbles. Others randomly explored the beltweb with varying degrees of interest. There were thousands of beltweb Forums but most people in the bubbles only explored a small number before returning to matters of their own condition. If someone stumbled upon the spinworld forum they might have taken interest to note that work was proceeding well at Rose World, if they had ventured to read and understand what the Spinworld project was.

If one randomly sampled the beltweb it would most likely reveal quickly that these people didn’t have much beyond their words. There were entire forums dedicated to the trading of many and various things which were cheap and common on the Earth and had at least until recently had been easily available in the bubbles. Things like wine, meats and other organic luxuries, which were fetching very large prices in the Belt. A common first perception was that the Belt citizens were polite but very poor, suffering from the lack of many things, and so far apart that they could only communicate with each other using computer networks and page forums.

Compared to the luxury that had always filled the bubbles it seemed spartan, where it wasn't an absolute wasteland.

So it was natural for many people in the now very overcrowded bubbles to fear that the people of the Belt would want come to the bubbles looking for a place to stay. The Outer Earth Survival Committee had strongly warned against allowing a new rush of refugees. The bubbles were already packed beyond their capacities with people. The still incomplete and unpressurized da Vinci was being towed and construction continued through the journey, despite shortages and other problems. Most of the space industries were already inside of the bubbles, but the few dozen remaining factory ships from Earthspace followed the bubbles using their own positional thrusters. Some were actually slower than the towed bubbles and lagged behind, complicating the logistics of work on the Da Vinci.

Ian and Helen accessed the beltweb and began to learn about the Belt. They had no idea there were so many people in the Belt, or what life was like there. Unlike others in the bubbles, they stumbled onto some pages which linked them to a home page for someone who lived on 'Renzo's Rock. That page had music that appealed to Ian and they followed several other links from that page. In the course they learned a few things about 'Renzo's Rock, but more importantly, they found someplace in the Belt that they though was interesting and even appealing. Although, neither of them had more than a few hours of experience with zero gravity and they couldn't imagine what life would be like in 1/100G.

Then they followed pages that led them to some of the key forums in the belt-wide webdebates, and one of those had led to the Spinworld Accord and the Belt Accord on Government. Since their classes had been suspended indefinitely, they'd had nothing else on which to focus their minds. They had spent most of their lives until just a few months earlier deeply embroiled in academic pursuits. Now they craved some work into which they could disappear. They studied the beltweb late into the night, until their eyes ached. The research had distracted them from the horror of the day. The humanity and the hope they discovered in the Belt seemed somehow to balance their grief leaving them in the middle, simply exhausted. They went to bed for the night and stayed close while they slept.

People on Earth had long enjoyed the benefits of networked information webs. Those webs had improved people's lives and their understanding of each other. But on Earth people always had the option to easily visit one another if they wanted, or engage in real-time communication. There was no more than about two seconds worth of real-time delay in any communication sent from anywhere in the Earth and Outer Earth to

anywhere else in either. A few hours of travel were all that was needed to visit any place in Earthspace.

In the belt, however, time delays could be half an hour or more. It meant that synchronous communication was impractical. You could not expect to simply call your friend and have a conversation. Anything that required two people in different parts of the Belt to coordinate in time was difficult or impossible. Instead, people communicated asynchronously. There was never an expectation that a response would be immediate. This was sometimes frustrating, but it was just the nature of life in the belt.

It was difficult for someone who had not lived in the Belt to comprehend just how integrated the beltweb was in everyday life there. One understood very well though after living in the belt for even a few weeks. If the beltweb were to somehow cease to exist, it would be like breaking the spinal cord of some great beast. The people in the Belt would survive for a while, but it would mean the death of the connection between people and therefore of the Belt society. Earth had a long history of survival without an information infrastructure; the Belt had no history without one.

The next day, the auxiliary daylights on the inside of the structural arches were turned on so that normal light level could be maintained. Some plants had begun to wilt and brown, showing signs of inadequate light. The brighter daylight seemed to lift people's spirits and people were relieved that Heccat was now past and out of their lives.

The journey continued and people wondered through their shock what their life would be like now. People planning the actions in the immediate future were focusing on making the bubbles as self-sufficient as possible and finishing the da Vinci so that more people would have permanent living quarters. More than 90% of the people in the bubbles had lost everything material they had owned. The refugees were completely at the mercy of the original Outer Earth population for everything needed for survival or any other purpose. The refugees were an instant second class in the bubble society. While some didn't mind being cared for, most wanted to contribute somehow or needed things they didn't have and were frustrated to be so powerless.

Word of the objects following Heccat reached the bubbles and began to spread. Speculation began to flower into hundreds of different rumors. One popular rumor was that these were creatures that were following Heccat as some kind of god. Another rumor held that what followed Heccat were space ships holding alien crews, ready to invade Earthspace (never mind that anything of value for them to take had already been obliterated). Rumors don't need to make sense: they just need to be provocative and easy to embellish. Another rumor held that these were

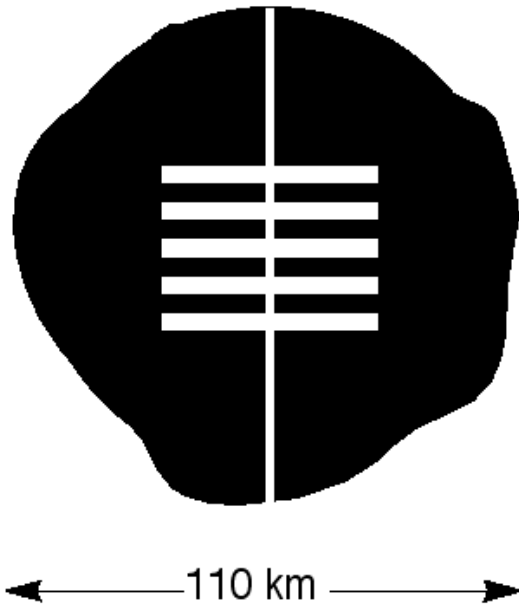
fragments of previous encounters Heccat had with other planets. Scientists studying the objects would make no claims yet, although they generally scoffed at the rumors. Most scientists willing to venture an opinion believed the followers were some kind of excretion peculiar to Heccat.

Ian and Helen spent the day delving deeper into the beltweb. The more Ian learned about the Belt, the more fascinated he became with it. He learned about the rock hunters and about Jane's World. He reviewed the latest status on the spinworld project and was amazed to find that the first section would be pressurized in just over two months.

He read about how the spinworld was created and he was amazed. He learned that first a pilot hole had been drilled completely through the asteroid's rotational axis using a high-energy drilling laser. Then a 500 meter cutting jig was used to cut a circular slice one kilometer in diameter and a few kilometers deep. That cut defined the walls of a cylinder. A three-meter shaft was then cut to the same depth along one edge of the cylinder. Then a cutting laser was lowered into the shaft and it cut the massive column free. It was gently pulled out of Rose World in a maneuver that was affectionately called popping the cork. The procedure was repeated using the original pilot hole, until the one-kilometer shaft went all the way through Rose World -- one end to the other, along what would ultimately be its center of rotation. It had taken nine weeks to cut the core. The many two-kilometer long columns of rock were left intact and were stored a dozen kilometers away for later use.

Helen had been studying the Belt Accord on Government and the pages that led to it. Ian invited her over and they marveled at the Spinworld plans. They read that once the core had been cut, a series of five cylindrical regions 60 kilometers in diameter and 10 kilometers thick would be cut from the center. The empty discs would be separated by four kilometers of solid rock each. The separators and the discs would all be aligned along the central core.





## Rose World Cross Section

They read on and learned that the large and small pieces of debris would be moved out of each growing void and through the South pole using a series of annular deflectors. In essence, Rose World regurgitated the debris slowly from the South Pole. Rock hunters would then maneuver the pieces until they were moving safely but slowly away from Rose World. Ships with supplies would fly in through the North pole of Rose World.

The plan specified that the interior would be sealed. Daylights would be installed at the edge of the core pointing down toward the floor of each disc. Each disk could be pressurized separately and only the first two would be pressurized initially. The separators between the discs would be equipped with dozens of elevators up to the core.

It was going to take a very long time to get the spinworld rotating fast enough to produce the desired  $1/3$  G on its interior surface. Even as the digging had begun, thrustplants had been attached to the surface and fired up. There would be so few thrustplants initially that they would have no appreciable effect on the digging process. Nonetheless, a ship's pilot would be wise to avoid the near-light-speed exhaust from the thrustplants. When there was finally a full complement of ten thousand thrustplants around the equator, flying across the equatorial plane would be dangerous within 10 kilometers of Rose World. But it would take a few years to get that many thrusters. A careful placement of thrust positions around the equator was planned to ensure that the spinworld did not develop a wobble.

During the dig, a spaceport had been built around the core shaft at Rose World's North pole. The poles were the only place a ship could

conveniently land and once the spinworld was rotating at its target speed, landing there would be an interesting task. The final rotation speed would be so fast that a complete revolution would take just over ten minutes. It would be slow enough to make landing at the poles manageable if one understood how to fly in a thrustorbit. But at the equator the surface velocity would be about 600 meters per second! No ship could land at that speed without accomplishing a thrustorbit of over 60% G, beyond the ability of most ships and pilots.

Ian and Helen finished the summary of the Spinworld plans and now they read about its current status. The interior digging had been underway for just over a year and the interior discs were mostly cut. Major terraforming was underway in the first two discs, to carve mountains, plateaus, valleys and other features into what would be the floor of the discs once spingravity was present. All the heavy rock work was to be completed before Rose World was set spinning. Spingravity would vastly complicate the construction and would have made the dig phase infeasible. Most of the core elevators were already in place, although they were little used because ships regularly flew inside the discs.

Ian and Helen took a break and talked. "It's amazing what these people have done." Ian sounded exhausted. "They're building a world inside an asteroid. Its got almost ten thousand square kilometers of land with gravity. That's way, way more than all the bubbles combined, if we counted the da Vinci and it isn't even finished yet." Ian shook his head dumbly.

"I wonder whether the Survival Committee knows about this?" Helen asked and then added, "I mean, they're working on the da Vinci like it's our only hope."

"I read on one of the Spinworld Accord pages that there wasn't much interest in the spinworld back on Earth, but it didn't say anything about reaction on the bubbles. Most people I've talked with are more afraid of the belties than anything else — afraid they'll want to live here in the bubbles. The committee has been warning us over and over that we can't take any more refugees."

"I don't think the Belt is looking to us to save them." Helen sounded very thoughtful. "I think they have been planning on saving us and nobody has listened to them. They'll have habitable space in a couple of months. I don't think the da Vinci will be ready by then."

"Yea. It seems like every week there's another problem — something else that has to be made from scratch. And without the moon, where will the rest of the titanium come from? Who knows when it will be done... If the

Survival Committee knows about the spinworld, they haven't been too interested so far." Ian said.

"I wonder why? We should ask them." Helen said it simply, but Ian knew she wasn't afraid to do just that.

"Why not? We've nothing to lose." Ian agreed. Then he suggested, "Let's find out when their next meeting is and see if we can ask one of the members." Ian used his console to access the Survival Committee's meeting information. "There's one in two days, but it's on Floyd. I wonder how we can get there?"

"Well, there must be shuttles between the bubbles, because they've been bringing in shipments of food. Maybe we can tag along on one of them. Or, maybe we don't need to be there at all... Maybe we can just post a page to one of the bubble webs. It seems that in the Belt they decide almost everything over their webs. Maybe we should follow their lead."

"There's a webforum for the Outer Earth Survival Committee members, but it won't accept a post from us. There's also the public Heccat webforum; I know it accepts posts from anybody. The scienceweb does too." Ian said.

That night, when they tried to connect to the beltweb, they found that it was no longer possible. The bubble network was now filtering information from the Belt and without clearance or a password Ian was unable to access the beltweb. Had people in the Belt been trying to contact they bubbles they would have found that to be impossible too.

"What the hell?" Ian swore. "They shut down access to the beltweb!"

"Those shits. They're afraid of the Belt."

"Afraid? Of what?"

A few minutes passed and then Helen shook her head and said, "You know, I just can't believe that the Survival Committee hasn't heard of the plans for the spinworld. It just doesn't make any sense. These people aren't idiots. They aren't all old and tired like Christopher Floyd. I think they've been pushing a quiet campaign to build up a fear of the belties. I think there's more going on than it seems."

"What? Politics? There aren't any governments left! The Survival Committee is the closest thing to a government anywhere in the solar system!"

“Well, now, that’s not exactly true, Ian. There is the Belt Accord on Government too. They plan to be a direct democracy and they are planning to not have any currency or other form of money.” She said

“No money? How does anything get done?”

“Ian, they built their spinworld without money. You didn’t read the pages that led to the Belt Accord on Government, the BAG, but I did and there were some eloquent posts. They formed a government around their shared vision of their needs. They decided they needed a spinworld — a new home for humanity in space. Their society works because the people understand how they fit into it, because they do what they say they will do and because they share their ideas with each other.”

“Yea? Kind of utopian, don’t you think? You know what happens to utopias...”

“They fall apart, at least in the novels. But the Belt isn’t a utopia, I think. I think its more of a grand co-op.” She smiled.

Ian looked out their front door, down the corridor of doors that led to small apartments. Then he said, fatigued, almost defeated, “That’s not how it is in the bubbles. People still use money here. Money still affects people and what they can and can’t do. We can’t afford a flight to Floyd bubble to discuss this in person with the committee — if they’d even listen to us anyway.”

“If we were in the Belt all we’d have to do is post a page, like ‘Renzo did.’”

“Renzo?” Ian yawned.

“I’d point you to the page I’m thinking of, except that they shut down access to the beltweb. Shits. Anyway, ‘Renzo said something really profound. Something like: ‘We can’t afford to treat our survival like a business, because it might not be profitable to survive.’ Now I’m understanding what he meant. The bubbles are a captive market and a small group of people control the manufacture and distribution of everything. Now you don’t have the option to buy something from somewhere else if you want to — you have to go to them if you want it at all. It just makes those few people in control of the supplies that much richer and more powerful; it doesn’t actually help meet the needs of our society anymore.” She stated. “What do we do if they raise their prices?” She asked rhetorically and raised her hands in a gesture of dismay.

“See, without enough competition, capitalism doesn’t work very well. Our economy is at the mercy of anyone in control of anything important. Do

you remember the history of the Twentieth Century medical industry? Do you remember the medical system crash of 2031? With the blind assistance of the government a few companies and professional organizations managed to raise prices of medical services until it almost bankrupt the country. Do you remember what turned it around?"

"History was never my strong point..."

"They took a lot of the money incentive out of the medical system by making the entire system a co-operative. In essence, they made medicine a non-profit business. The doom and gloom scenarios painted of hoards of doctors quitting and drug companies quitting research simply didn't materialize. The few doctors who quit simply made room for the many young doctors who couldn't afford to open a practice before the change. The big drug companies still got to deduct the cost of their research, but not to charge more than production costs for their products."

"I remember it wasn't a popular decision with the medical industry."

"They lost because they won."

"Huh?"

"They lost their right to make a profit because they made too much profit. The rest of the country simply refused to be victimized anymore."

Ian stared at Helen questioningly. "What's that matter now?"

"Ian, the committee is afraid the Belt society will infect the bubbles. It would mean the end of their monopoly. Who's on the Survival Committee: the shipping consortiums, the bubble Captains and their staffs, and all the major industry execs. They're the only ones with a vested interest in keeping the bubble culture separate from the Belt. The argument that the belties might want to move here is ridiculous! It is a fear manufactured for the benefit of the consortiums! The Survival Committee seems to be more concerned with their economic prospects than our species' long-term survival or our happiness."

Ian sat back. "That stinks. Not your idea -- I think you're right. What the Committee is doing stinks. I can't think of any other reason they would have maligned the Belt as they have. Well, if it's true that they are so threatened, then they probably won't be interested in talking to us about it. They'll want us to be quiet, or maybe they'll try to force us to be quiet. Maybe going there in person would be a mistake..."

“But if we did what the belties do and post a message publicly. It would be impossible for the committee to keep it quiet. Of course, we’re nobodies here. People probably wouldn’t even read our posting, one of thousands each day. Lots more people know Athena’s name and face than ours.” She said highlighting the irony.

Ian nodded and looked down. Helen looked aside. Then they looked at each other and had the same thought at the same time. Ian smiled widely, “I think it’s time we showed Athena a console, don’t you dear?”

“I’ve always thought she had great potential as a writer.” Helen said and smiled deviously.

They both laughed and then they worked on the posting. They checked the beltography charts to see where Rose World was. It was 27 degrees spinward from where the bubbles’ current trajectory would leave them when they reached their final orbit. In the afternoon they created a new account for Athena and posted a single page to the scienceweb, the Heccat webforum, and the Outer Earth Defense webforum, which had been created by the Outer Earth Survival Committee to address the issue of defense of the bubbles in case the people of the Belt tried to *attack*. Ian discovered and exploited a subtle flaw in the bubble information network to gain enough access to the beltweb to post Athena’s message to the Belt’s main spinworld webforum, but he couldn’t connect to the webforum to determine if the posting had actually made it there.

From the console of the youthful Athena, along with her beautiful little smiling face, was posted the following page:

We may feel alone, the last survivors of Earth and Earthspace, but we are not. The Belt is home to more than a hundred thousand people who have been living and working there for many years. The Belt society has mobilized itself to create a staggeringly large living space called a spinworld inside a huge asteroid called Rose World. It has more interior surface area than all the bubbles combined and ten times what the bubbles currently have without the da Vinci. They built it for us and for them, so there would be a safe place for humans to live from now on. They began building it over a year ago because they knew we would be coming.

We are visitors now in a part of space to which we are unaccustomed, but this is their backyard. We bring with us the culture, technology and experience of our deceased home world, but they have the skills and experience to survive here. We will need to use the resources of the Belt in order to survive and who better than them to show us how? We have much we can offer

them as well and we can help them stock the spinworld with all kinds of life.

We have everything to gain and nothing to lose by working with them. Why then have we been encouraged to fear them? Why has their spinworld effort been ignored by the Outer Earth Survival Committee for so long? Why has our access to the beltweb been cut off if not to shield us from the truth by those who want to control us? We didn't elect these people but they're already deciding what we should and shouldn't know."

They spent the rest of the night reading personal replies from people on all the bubbles. Apparently, there were hundreds of people in the bubbles had been watching the progress of the spinworld project while there was still access to the beltweb, but nobody had spoken out. People said in various ways that the only thing that made sense was for the remaining people of Earth to work and live together. But there was no official response yet from anyone on the Survival Committee.

The message had reached the beltweb and many people tried to reply, only to be frustrated when their replies were rejected by the bubble information network.

The next day there was a public response. It came from Wayne Arnold, the Captain of the da Vinci. He knew better than to attack the posting on the grounds that it appeared to be posted by a child of less than two years who obviously couldn't have written it. He understood the immense danger of the widely distributed posting and he had crafted his reply carefully.

I and others have reviewed the spinworld project already. We believe the da Vinci can support all our people. We're going to need all our resources to complete it and save ourselves. Our survival is our number one priority. I oppose getting involved with the spinworld project at this time, at least until the da Vinci is completed and we've cared for all our own people.

We cannot accept any refugees from the Belt until we are able to take care of ourselves. We felt limiting contact with the Belt would shield our people from the propaganda the Belt might use to coerce our people into opening our doors and letting them in.

Shortly after there was another response, this time from the acting chief executive of the largest food consortium in the bubbles:

In my opinion, the spinworld is an ambitious solution to a problem we don't have yet. We will have plenty of space and plenty of food

for our own people. I agree with Captain Arnold: our own survival should come first. I oppose immigration from the Belt and getting involved with their dubious spinworld project, which will not even have a fraction of the gravity we enjoy in our bubbles for years to come.

But, an hour later there was another response. This time it came from Gwendolyn Snyder, the Chief Officer of EcoMan — the Department of Ecosystem Management for the nee Outer Earth. Gwen was an outspoken member of the committee.

We are only at the beginning of our struggle for survival. If we finish the da Vinci, we'll be able to provide housing for all our people, but it takes more than that for us to survive. The ecosystems of the bubbles are already suffering due to our overcrowding. Their survival is our survival.

We might barely have the resources and technology to finish the da Vinci, but we cannot hope to build another bubble any time soon. So, if our population is to grow, to thrive, we'll need another place to live before long. I support cooperating and contributing to the spinworld project.

There were several more postings by committee members. They all opposed getting involved with the spinworld project. Each was well written, eloquent if rhetorical; many had been prepared long in advance.

As the committee's first order of business when they convened an emergency session to deal with the uproar, Gwendolyn was summarily fired. While they were meeting behind closed doors, there was a response from Christopher Floyd, who had not been invited to the meeting. As the designer of the Floyd bubbles his opinion was of acute interest to everyone on both sides of the issue.

I'd not heard of the spinworld project until now. It never came up in the committee meetings, although I don't know why — but, I haven't attended all of them. I'm old, you know. The da Vinci might be able to hold us all for a while, but in what quality of life? Almost everyone will be living below the interior surface. Walls make minds small. You can bet people with money won't want to live there. The spinworld they're building would let everyone live on the interior surface. It's the difference between survival and living. I like the idea of the spinworld project, and shame on those members of the committee who vote against this! Who do you work for anyway?



Then there were hundreds of postings. People were almost unanimously in favor of contacting the spinworld project leaders and offering assistance. The only people opposed were the elite upper class of the bubble economy. They were in control of the information networks as well as most of the rest of the infrastructure upon which all lives in the bubbles depended.

The following day, there was a hastily convened meeting on Floyd. It was a public meeting and most of the people in the bubbles tuned in to watch. A third of the members were emphatic that they would resign if the committee voted to assist with the spinworld project. But Christopher Floyd spoke convincingly and at the summation of his comments, he displayed a tally of the 'for' and 'against' postings across the various webs. The graphic showed convincingly that there was overwhelming popular support for getting involved in the spinworld project. Before the meeting was over, a third of the members had resigned and they began organizing as an opposition political party.

Then a dozen men armed with pistols escorted five network engineers into the main computing center on New Eden. The guards in the computer center denied them entrance.

"We're here to enable access to the beltweb." Said a curly haired network engineer.

The guards stood by and would not open the door. The men raised their pistols and shot the lock, then forced their way in. The guards did not oppose them but stood out of the way and crossed their arms in tacit support of what was happening. The curly-haired man said, "Thanks. We won't be long. We won't damage anything else, if you give us keys to the computer room."

One of the guards spoke up. "I can't do that... But, I will come with you and open whatever doors you need opened."

"All right then. Come on."

The guard led them through one pair of wide doors into a room with hundreds of racks of computing equipment. It was slightly warm in the room and there was a gentle hum from the equipment. They found a network operations console and within a few minutes they had opened access between the Belt and the bubbles.

Word that the network was open again spread quickly and people read the spinworld plans, the BAG and more.

The remaining members of the Outer Earth Survival Committee drafted a page and posted it to the Belt's main spinworld webforum. The Human Survival Pact was proposed in a post on September 21, 2144, four days after the death of Earth, from the account of the Outer Earth Survival Committee.

We, the survivors of the Earth and Outer Earth, in order to ensure our mutual survival and provide for a more livable future, hereby offer our assistance to you, the people of the Belt, in your efforts to build the first spinworld. We offer what we have and ask to share in the bountiful world that together we might create. We acknowledge your foresight in undertaking the task on your own and we regret our late interest. We hope you will accept our offer, since none of us has anywhere else to turn now but to each other. Separate, we might survive, but together we might yet live.

Now, people in all the bubbles began to explore the Belt webforum archives and they learned about 'Renzo's Rock and Rose World. They learned about Jane's World and the rock hunters. It was the first time most of the people on the bubbles really took the time to learn about the Belt and the people who lived there. Minds changed and suddenly the belties weren't a threat any more. Now they weren't a throng of hungry refugees, begging at the door. They were becoming neighbors.

Even as the page was posted, the huge interplanetary craft changed their course very slowly and began pulling the bubbles to a different destination. They would eventually still orbit the sun inside the orbit of Mars, but now they would be moving toward Rose World. The course of the bubbles changed, and so with it did the course of human history.

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Meanwhile, the Research ship Nolan had arrived at its rendezvous with the followers of Heccat. It matched speed with them and followed them back toward Earthspace. Scientists aboard the Nolan performed complex analyses of the microwave communications and detected patterns, but they could not fathom their meaning.

The Pact and the spinworld had so captured the attention of people everywhere that the followers were forgotten by almost all except those involved in the research about them. Earthspace ceased to be of interest to most people. It was a reminder of their great loss and it was now an inhospitable, dangerous place. Most people were happy to leave Earthspace to the scientists who studied it. People were drawn instead to look away from the sun for their future.

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The dig on Rose World was ahead of schedule. If it had been a financed, subcontracted corporate project, it would have been behind schedule and over budget. Instead, people worked as long as they possibly could before resting. They looked for any opportunity to be more efficient, save time, or improve the quality of work. It was a grand effort that brought individuals together, as though they were fighting side-by-side in a war, except that lives were not being destroyed.

There were problems too. There were limited resources so people had to find ways to cope. The situation might have degenerated into petty bickering over alternatives. It didn't. There were natural leaders motivated by something other than personal power or wealth. All that remained to conquer in the Belt was to earn the honor of respect from others in what might be mankind's last great work. The result of that work would be a chance to live a decent life and the continuation of the human race — not small stakes. Everyone working on the spinworld instinctively knew that what mattered was finding ways to get the right things done as efficiently and safely as possible. They had broken their addiction to currency and profits and power. Now they just wanted to see how well they could actually do something together when nothing else mattered.

It wasn't difficult to earn respect from and then even a degree of power over others by being communicative and constructive instead of political or self-centered. By contrast, the traditional traits leading to power on Earth simply didn't work in the Belt. Withholding information was impractical at best and usually just meant that your information was out-of-date. Everyone else rejected the attempts to spread fear, uncertainty and doubt. From the perspective of the belties, fear uncertainty and doubt were a step up from where they had been. This was perhaps poetically balanced by the fact that a staggering amount of real work was getting done in the Belt. Great changes were being made in how the Belt society operated even at the most fundamental levels, yet it was unmatched by the despair that throughout human history has been the mover and shaper of great changes in a society.

Leaders in the Belt recognized that their own success required their living up to their own potential as facilitators of human endeavor rather than hoarders of privilege and wealth. There was no privilege, nor wealth to be hoarded. The natural leaders came into their own power as they might, but there were not enough of them. There were also precious few experts in some areas and a shortage of skilled or educated people in many areas.

There were some poor leaders too, but they generally meant well. The worst cases didn't last long though because there was no official support for anyone in any position. The lack of money had eliminated the security of employment. If people didn't trust you to do a job nobody asked for your

help. If a manager wasn't doing a good job, the workers would find another one, or one of them would assume the role. It was always the followers who empowered their leaders.

If there was one skill that was in abundance in the Belt, it was digging. Digging asteroids isn't like digging holes on the Earth. High-power lasers cut through rock like butter. Sections were cut away in a pattern that allows the pieces to be removed easily. Digging was typically performed as part of mining, to extract valuable mineral concentrations from within asteroids. But many of the settlements had relatively large excavations that they used for storage. None of those storage vaults were anywhere near the size of Jane's World's natural cavern and Jane's World was quite tiny compared to the spinworld. But all the same techniques and tools worked just fine on Rose World and in its excavation, digging was taken as a new art.

A top-notch rock digger riding a 2-centimeter laser platform, supported by ships to clear the cut blocks, could clear a cubic kilometer in a day. There were as many as 500 diggers working each day, by the time the half-way point had been reached in the dig — they were limited only by the number of cutting lasers they could keep operating. More were being built constantly and arrived at Rose World every few days, but they were also relatively fragile and not designed for continuous operation. There were also a dozen six-centimeter lasers. These were used mainly for very long cuts, but a few of the best cutters as they were sometimes called did regular work with them.

There were a few accidents and some people lost their lives. A cutting laser accidentally hit one person. Three people were crushed by rock debris in separate incidents. But after each accident, people talked and figured out how to avoid that kind of accident again. There had been no more fatal accidents after the first three months of digging, but there were still occasional mishaps. The work was not without risk even though safety measures had been followed. Sometimes cold rock will explode when hit with a cutting laser, and while usually this is harmless enough, it was that injection of chaos into the process which could occasionally manifest in an unfortunate chain reaction, such as when an explosion deflected a rock hunter as he was moving a large rock, which then bumped into another, which hit a cutting platform, whose 2cm beam sliced across another cutting platform, nearly hitting its operator. But it had missed, fortunately, and the work continued.

Now that the discs had been cut and the terraforming was underway, the nearly endless stream of debris that had been flowing out from the South pole was only a trickle. When the debris was large chunks, it was trained individually by rock hunters. When it was composed of smaller pieces,

large barges would accumulate a load and then release it downspin of Rose World, out from the sun one hundred kilometers, moving spinward very slowly with respect to Rose World. There had been a lot of debris. The debris from Rose World's excavation added significantly to the number of rocks in the Belt. The debris was deposited primarily in one area, which created a dense clump there. One big clump was easier to avoid than lots of smaller concentrations. A name was needed for the new clump, but nobody really wanted a clump named after themselves. Finally, someone suggested that it be called the Aphid clump. The name was quickly accepted.

The Aphid clump was a one hundred kilometers further from the sun than Rose World, and orbiting slightly faster, so it would be many millions of years before the debris would make it back anywhere near Rose World. It would also not intersect the orbits of any of the other Worlds in the Belt during that time.

Hermes and Rose provided almost continual scans of Rose World during the year-long dig phase of the spinworld project. It was long, tedious work for both of them. Rose eventually found herself in the role of the primary local coordinator of the spinworld project. It hadn't started out that way, but because she always had up-to-date information on the progress, people naturally turned to her for accurate answers. She was also a natural leader.

Hermes and Rose both worked with the Crawford Scanner and answered many requests. Hermes could answer many questions simultaneously when there was a burst of straightforward requests. But people started asking Rose about larger scale cutting strategies and how they might organize people's efforts. She had experience in business on Earth to inform her management duties. With the Crawford scanner she could see the problems developing using scan-based simulations and she could see and plan solutions. It was her idea to cut all five discs at the same time instead of serially. It helped keep workers out of each other's way, making the work safer and more efficient, and made it easier to remove the debris. She had made a few other contributions as well, including the creation of forums to discuss work safety, efficiency and techniques.

Ishmael sometimes borrowed a small rock hunting ship and helped with the handling of debris. There were dozens of new ships being produced each week throughout the Belt. The ships were basic but functional. One or two people could live in one, but they were not big enough for it to be very enjoyable for a long time. The long flight back to Rose World was a trial for many of the pilots, but they endured it since it was a chance to finally have control of a ship they could never have afforded to purchase.

The minds of the ships were simple. More sophisticated artificial minds had always been produced on Earth. Advanced artificial minds required more than just the computer hardware: the hardware could be produced in the Belt. They required more than just the software too: there were copies of the source pages for several of the better mind operating systems in the Belt as well. The difficulty was in building and integrating the software and its databases inside the hardware. The process of building minds was still largely a black art. Cloning minds was theoretically possible under some circumstances, but even on earth it had proved much more difficult than expected and the results had been disappointing. Cloning was more than just copying the data. The hardware had to have gone through the learning process too, or it would be like a child reading a book on how to behave like their parents.

An artificial mind was a delicate synergy of hardware, software and data evolving together across time. The process turned mere data and electrical components into awareness and meaning. Change one aspect, like the order of experiences or the time frame in which they occur, and you don't have the same artificial mind anymore, if indeed the resulting machine achieves mind status at all. When an artificial mind doesn't work or goes into a tight loop, it might not even be feasible to determine what happened or why.

Artificial minds transcended their automaton nature like a fractal transcends two dimensions. The minds built in the Belt were functional, but much less than human. Yet, they were more than reptiles too. They were something like a dog's mind but with a built-in understanding of ship operations and beltography.

The shipyards were widely distributed throughout the belt — sometimes it would take months for a newly made ship to reach Rose World. The ships arrived with pilots for the first few months of the dig, but then a call went out for pilots because there weren't enough. Moses had then rounded up a dozen diggers who were also pilots, but without ships of their own, and ferried them and Ishmael to three of the closest shipyards.

Each pilot was given a ship at one of the shipyards, and they attached one or two ships to their hulls and hauled them back to Rose World. The round-trip had taken seven weeks for Betty, but some of the pilots had returned to Rose World as soon as two weeks after Betty had left there. The new pilots assisted in training debris and nearby rocks, keeping the Rose World spaceport safe from collisions with other rocks, escorting barges of supplies, and maneuvering large chunks of debris inside or outside of Rose World. The rock hunters would fly inside and use their thrusters, deflectors and cargo hooks to manipulate the large chunks directly.

Perhaps not surprisingly, the rock hunters enjoyed the interior work. They developed a lingo to make it easy to work together on the bigger chunks. They also discovered that they could safely bounce off of the big rocks. The chunks were moving fairly slowly and the ships weren't moving very fast either. The deflectors were designed for very fast, fairly small rocks. With the low velocities, the ships were almost invulnerable to collisions. The only real risk was of being crushed between two big rocks, or between a big rock and an interior wall.

Rockpool was born in the depths of the primordial Rose World when two rock hunters wagered on whether one rock could be used to drive another into the core, where it would be swallowed out. He had missed, but his friend had succeeded. After that, the rock hunters could occasionally be seen pushing rocks into position to try a challenging shot. All that mattered was that they didn't hurt anyone and that they kept the area clear enough so digging could proceed.

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Not many people in the Belt were much interested in the objects following in Heccat's path. Those who took an interest were at the mercy of the Outer Earth's scienceweb for information and that information had all but dried up within a couple of days.

On the day that the Earth had died the people of the Belt were in shock and sadness. Nobody worked. Almost everyone had lost their families and friends.

Another sad day went by and then three more. Most people in the Belt were no longer in shock, but they were changed. It wasn't the topic of conversation, but almost everyone felt very, very alone. The webforums were more active than usual. Some people just wanted to connect. Others buried themselves in whatever work they had. Still more people were volunteering to help in any way they could. But there was little for them to do now until the spinworld was pressurized. There would be more than enough work for everyone once even a single disc was pressurized — a world needed to be built.

Five days after Heccat killed Earth people in the Belt who were following the Outer Earth scienceweb learned that Scientists at New Eden had lost contact with the research vessels in Earthspace. It was perhaps a small point in the machinations of a society building a new home; however, it was alarming to anyone who knew and took the time to realize how unlikely it was that all of the ships would lose contact simultaneously. The matter was taken somewhat more seriously in the bubbles, where the science crews had family and friends, but there people were more

interested in their daily survival, which for many meant waiting in longer and longer lines and still not getting what they needed or wanted.

People in the Belt still closely followed the spinworld webforum. The spinworld was the focus of life in the Belt now and its webforum was how people's ideas, requests and offers reached each other. The Outer Earth Survival Committee posted the Human Survival Pact to the spinworld webforum. It was available everywhere in the Belt a couple of hours later. At first, people wondered if it was a hoax, but the Mayor of Jane's World had made a time-delayed holocall and had confirmed that it was a legitimate offer. Now, most of the people on the bubbles tuned into the spinworld webforum, to follow the postings of the belties discussing the offer. The honesty and openness of the postings by the belties impressed the people in the bubbles. It served to remove from the minds of most of the people in the bubbles any lingering doubt about the belties' motivation. It was easy to admire the spiritual freedom the belties enjoyed.

A referendum vote was taken. There were a small fraction of voices that opposed accepting the offer, but a staggering 98.9% of the votes were in favor of accepting it. The news reached the bubbles. People everywhere began to cheer as soon as they found out about it. If there was ever any doubt in the minds of the Survival Committee about the intention of the belties, there wasn't anymore.

The new course for the bubbles would bring them to a point that was about five days journey from Rose World, but it would take them another twelve weeks to get there. There were plenty of faster ships though and plans were being formed to send a group of advisors and observers to Rose World, to see what could be done to help. There were thousands of volunteers. A crew of forty-seven was chosen and they left on a fast ship. It would reach Rose World in nine days.

People were overjoyed throughout the Belt. Many belties had at least seen a bubble and some had been in one. But many had no real idea what the bubbles were. Almost a quarter of the population of the Belt was born in the Belt. Most belties had no idea that now there were ten times as many people in the bubbles as the entire Belt combined. Most had no idea of the biological and cultural treasures the bubbles contained. Only a few had any idea of the beauty that had been life inside the bubbles when they were in Earthspace. But they all knew that the bubbles had people in them that had escaped the fate of the Earth and now they were coming to help with the spinworld.

For weeks people in the Belt and the bubbles explored and participated in each other's webs and they began exchanging personal pages. Sadly, only a very few of the survivors from Earth had relatives in the Belt, but for



those few, it was a reunion beyond all hope. If crowds behave like lower animals, then societies might be most base. But, each person in a crowd or a society must either choose to lower themselves or not. Without the incentive of mutually exclusive survival there was no motive to become the base animals of which all humans are capable. It was mutually inclusive survival instead that motivated people in the bubbles and the Belt, and that was a force of ascension instead. They recognized that they needed each other even though they were already very different. Two societies looked at each other as the last man and woman on Earth might have, if there had still been an Earth.

Two weeks after the Belt had accepted the offer from the bubbles, a sleek Earthspace cruiser floated down to the almost imperceptibly rotating spaceport on Rose World. The crew disembarked and was shown a grand tour of the new spinworld. Each disc was large beyond comprehension, especially for someone used to life in a bubble. Each was 60 kilometers in diameter, instead of the 5 kilometers of a bubble. The floor of each disc was 10 kilometers wide and almost 190 kilometers long; whereas, the bubble floors were only 2.6 kilometers wide and 12 kilometers long. There was tremendous surface area inside each disc and people could build down into the rock below the floor as far as they wanted to — kilometers deep if needed — to increase the usable space a thousand-fold. It would be a truly staggering source of gravityland, some day.

But at the moment it was also overwhelmingly empty, cold, dark and sterile. There was enough light to work by, barely, but no air. There were mountains of rock and other interesting formations, but it was all just carved rock. There was no life. It would take an incalculable amount of work to make it into a living world. It was clear within minutes that the bubbles could do nothing to help with the dig or the terraforming. Both would be completed at about the same time that the bubbles would arrive at the endpoint of their current courses. In fact, the belties were doing a great job at everything they had attempted — they hadn't needed any help yet. But they hadn't begun to build an ecosystem in the spinworld yet either.

Building an ecosystem was a subtle art requiring a mixture of science and experience. There was no one in the belt who had experience starting an ecosystem that large from scratch. There were people in 'Renzo's Rock who managed the ecosystem within the large cylinders, but there the ecosystems were miniscule and involved relatively few plants and animals by comparison. Whereas, mankind's foremost experts were currently living in the bubbles. They had been balancing ecosystems in the bubbles for a long time and New Eden was already equipped to restart an ecosystem from scratch. A larger ecosystem took longer to spread, but was less likely to collapse once it could be established.

A Spinworld Ecosystem webforum was created and Spintech created a new role called Chief Spinworld Ecologist. It was left up to the bubbles to nominate someone for the role. It was no surprise to anyone in the bubbles when Gwendolyn Snyder was the nominee. She had accepted and put together a program for how the spinworld ecosystem could be started. She knew that plants would be critical initially, to keep the oxygen level sufficient for life. She planned for a variety of small animals and insects to be introduced initially to support the plants. She planned to introduce larger animals as the oxygen producing capacity could support them and the food base increased sufficiently to support the new species. There was no real danger of plants overrunning the spinworld because there wasn't enough soil for that to occur. Plants would require soil and initially soil would have to be synthesized. There was an abundance of food synthesis factories and several were converted over to soil production instead. The first shipments of soil were waiting in space crates on a barge a few kilometers from Rose World within three weeks of their request.

The interplanetary craft hauling the bubbles idled down their thrusters. The bubbles would float a long way and fall into an elliptical orbit because of the massgravity of the sun. They would remain in that elliptical orbit if nothing else was done. But near the end of their flight, the huge interplanetary craft would reverse their engines and slow the bubbles into their final orbit, which would be nearly circular. The final deceleration would last six days and would begin in four weeks — the first day of December.

As the bubbles approached their new destination, the terraforming was completed in the first two discs and the spinworld was being sealed and made ready for air. Each disc was being made separately airtight. The core was sealed with discs made from the columns removed when the core was originally cut. These were rock-welded in place by injecting molten rock into the seams with tremendous pressure to form a complete seal at least as strong as the rock around it. There were many tunnels cut through the walls separating the discs and these were equipped with airlocks to keep the air supplies separate. Materials would enter the spinworld through the core and then descend on gigantic elevators to the floor almost 30 kilometers below. There, according to the development plans, materials would eventually be distributed through a series of maglev transport conduits that would reach every disc. In the mean time, people would use floaters to move things around until the transportation conduits could be built. Only the first two discs would be pressurized initially and almost all of the construction would be happening in the first disc.

Three weeks before the bubbles reached their destination, the first puff of air was released into the first disc. It would take two days for the air to be released and fill the disc. The temperature inside was unbearably cold already due to the rock itself being practically as cold as the space around it. The air was flash-heated as it was released from pressurized tanks to counter the cooling effect caused by the drop in pressure. It would take many days of thermal conditioning to heat the interior of the first disc to a level where humans could even survive there. The heating was started hours after the first air was released. The second disc was pressurized after the first one was completed and it was heated slower than the first because there were not enough thermal generators for both. The daylights were installed in both pressurized discs and run continuously to help heat the air in them. To speed the heating process the daylights never dimmed. The constant daylight took some getting used to, but people adapted.

The first disc was pressurized, lit, warmed and capable of supporting human life on Tuesday, November 24, 2145. The daylights were set to a midsummer schedule and the first “sunset” ever in a spinworld occurred on that day. Thousands of people went inside the disc as soon as it was deemed safe. Everyone who was anywhere near Rose World wanted in. There were still many belties who had never seen the inside and they were awed. People who had flown ships and worn suits inside now looked around it with a new wonder. But there was still no gravity — Rose world wasn't spinning fast enough yet. It would take over a year before the spingravity of Rose World would equal even the tiny massgravity of Jane's World.

Rose, climbed out of her shower bag on Hermes and dried off. Tomorrow would be the first day she didn't need to coordinate work for anybody in a long, long time. From now on, most of the work was on the inside. All that would happen outside was the placement of thrustplants around the equator and some debris management from the remaining terraforming in the other three discs. She felt proud of her accomplishments and those of the people in the Belt. She was weary though. Weary from responsibility and weary from long days of tedious, detailed work. She climbed into her sleeping pocket and found a hand-written paper page tucked lightly into her pillowcase. It was folded in half. She opened it. It was from Ishmael; he'd written her a poem. She thought he must have snuck on board and left it for her. It had been months since the last poem and she'd forgotten how special it made her feel to receive one. It was scented with mint. She read it.

Once there was a lofty hoping  
Which wore upon hale hearts knowing  
That houses built may fall to ruin  
If built upon uneven ground

To build the house and see it fall  
Would be avoided if it could  
But such a course first demands  
An honest will to understand

So we danced together, built our dreams  
No profits or prophets called our tune  
That houses we built should always stand  
That dreams we shared would then come soon

From vision to breath, awaiting its turn  
Then set glowing its breath came creeping  
It looks and smells and feels like home  
But something wanted still lays sleeping

“Ishmael? Are you here lover?” She looked out into her bedroom but saw no one. “Hermes, is Ishmael on board?”

“No.” Hermes replied.

“When was Ishmael on board last?” She asked.

“Thirty two hours, seventeen minutes ago.” Hermes said with what might be mistaken for a slight chuckle.

“Don’t forget that I know how to push your buttons too.” She warned. Then she remembered that she and Ishmael had shared a meal together — her breakfast and his dinner. She realized she had not slept since then. She felt unbearably tired. Tomorrow she would call and thank him, but now she just had to sleep.