

Destination Azahar

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UNIVERSE: The Swarm Cycle

Chapter 27 - Exploring a Hot New World

With her experience as a multi-engine pilot on Earth, it didn't take Misty long to master the shuttle's controls. Once she began flying it more like a helicopter than an airplane it didn't take her much time to perform a few standard maneuvers to her own satisfaction. Like Nancy, Misty had an aversion to flying into a hangar, but even that hurdle didn't take more than a dozen approaches for her to overcome her instinctive reluctance.

Misty was impressed by the skill and confidence of her young instructor. Once she had the handling characteristics mastered, Misty began showing Nancy how to fly the nimble craft using the instruments built into the shuttle to perform the standard flight patterns and maneuvers used by instrument-rated pilots on Earth. Nancy was strictly a visual, seat-of-the-pants pilot. The sleep training had covered the maneuvers Misty flew, but some things needed to be demonstrated. Misty impressed Nancy when she blacked out the windows and brought the shuttle in for a soft landing at the agricultural dome.

They left the small craft near an airlock in the botanical research complex's central dome. The airlock gave access to the exterior of the complex as well as the exterior components of the cooling tower that serviced the facility. Instead of taking the transporter nexus that was built into the shuttle, they donned oxygen masks and lowered the hatch. The heat that flooded into the small craft was almost as though someone had opened an oven door.

Misty gasp, "Good God, it's hot here!"

Nancy picked up a bag containing additional breathing units and laughed into her mask, "You should be here in the summertime!"

Misty hesitated as she studied Nancy's body language, but couldn't get a clear reading. "You're pulling my leg, right?"

Nancy's only reply was more laughter.

They found Margret, Avalareddy, Brown, and two men that neither of them recognized in the spacious conference room that was part of the administrative offices of the agricultural complex. Avalareddy and Brown appeared to be very excited about something on a display screen.

Through the opened door the two women could hear Margret talking as they approached, "The small lake is between three and five meters deep in the center for its three kilometer length. It varies from 10 to 300 meters wide, probably averaging about 100 meters. The water exiting the pipe at the head of the lake is saturated with oxygen with nothing in the way of contaminants. It took about a month for the water to reach the top of the low-head dam we installed at the mouth of the canyon. I have no idea what the oxygen and carbon dioxide levels are along the length of the lake, but I'm sure it varies."

The taller of the two strangers asked, "What about nitrates, phosphates and potash?"

Margret shrugged just enough for it to be noticed. "None, unless the water has leached some out of the ground. The water leaving the pipe is just about as pure as we can make it. We use it for makeup in the evaporative cooling towers and for the glycol solutions that are circulated through the interior of the settlements and structures. I'm sure we can set up something at the discharge pipe to contaminate the otherwise pure water going into the lake and make it suit your needs."

"Hi, guys," Nancy interrupted the group as she and Misty entered the large room. "This is Misty. I've been introducing her to the shuttle controls, but I think she can already teach me more than I can teach her."

Misty blushed through her amber skin as she acknowledged the greetings given to her by those in the room.

When no one else spoke up, Margret introduced Naveen and Jason to Misty, and Ensigns Anton Deveraux and Jack Farrell to both Nancy and Misty.

"Misty and I are headed to Demopolis to fetch Governor Grayson. She asked for a tour of the agricultural complex. Are you guys ready for her and whomever she wants to bring along?"

Naveen smiled, nodded, and quipped, "Bring them on!"

The two young women took the lift down to the atrium and asked the AI to activate the nexus to Demopolis. In less than ten seconds they were walking toward the administration building that housed the governor's office.

"From a dark cave into bright sunshine," Misty complained lightheartedly. "Those transporter nodes are a rush and take a bit of getting used to."

Nancy laughed, "You'll get used to them soon. Before long they'll be less exciting to you than a limp dick."

Misty snorted, "A limp dick is sad, not unexciting. It's a condition that can usually be quickly corrected by a motivated woman."

The giggle-fest continued as they entered the governor's office. Martha looked up and commented, "You two appear to be in a good mood. What have you found that's so amusing?"

Misty caught her breath. "Nancy was comparing traveling by transporter stream to trying to ride a limp dick."

Nancy blushed and retorted, "That's not what I said! Misty said that stepping onto a nexus was a rush. I told her that after a few rides she'll find the transporter about as exciting as a limp dick."

Martha observed, "That sounds terribly juvenile of you both. I'm not sure flying with either of you today is such a good idea." She stepped around her desk and headed toward the door. "What's our first stop?"

"Where are my manners," Misty gasped with a hand over her mouth. "Nancy, this is Governor Martha Grayson. Martha, this is Nancy, a concubine in the Tuan Nguyen household, and my shuttle instructor."

"Thank you, Misty, but I had lunch with Nancy yesterday," Martha responded. "We're well on our way to being close friends."

"Won't someone else be joining us?" Nancy asked.

"No," Martha replied. "I don't have a staff position for terraforming. I was just curious to see if there was a plan to make the atmosphere breathable."

"There's a group working on that," Nancy replied. "Our first stop is to meet with Naveen Avalareddy. He was a professor of botany in Atlanta. My sister concubine, Margret, has been designing facilities to house his experiments and Doctor Brown's amazing collection of plants. They were with a couple of new people who arrived on *Chronos* or *Aurora* with marine plants, I think."

Martha ushered the women out of her office before asking the AI to close it until she returned. "Would that be the quiet lady sitting next to you yesterday, Nancy?"

"Yes, ma'am," Nancy replied. "She and Celeste are incredibly smart. Judith and Leroy are also showing a lot of promise. Judith is a bit shy and usually stays out of sight when Ms. Constance entertains, but I'm sure you met Leroy a couple of nights ago. He always runs the bar for her and is becoming a skilled geologist. He helped me locate a number of valuable mineral deposits."

"I'm so pleased to see that concubines are allowed to be more productive than the briefings aboard *Zephyrus* indicated," Martha observed. "Is your household a rare case? Wait, you just said that Constance's concubine, Leroy, is studying geology. I really need to start processing what I'm hearing. This is all very encouraging, indeed."

"Very few of the original concubines are only used for the sexual gratification of their masters," Nancy informed Martha. "I remained a virgin until long after I was taught to fly shuttles. Most of the stay-at-home group is best described as caregivers for the youngsters. My sister concubine Beatrice is like that. She not only takes care of the minors in my house, but coordinates with others in her situation to share the responsibilities and give the children an opportunity to socialize outside the home."

"Outstanding!" Martha enthused. "I don't want to do anything as radical as what Governor Flowers did on Demeter, but didn't want such a valuable pool of resources to be squandered. Am I safe in assuming that there are few instances where concubines are mistreated?"

Martha became concerned when Nancy didn't respond. In fact, the young girl almost visibly withdrew. Martha stopped before they entered the transporter facility. "I'm sorry if I broached a subject that makes you uncomfortable, Nancy. Please forget that I asked."

Nancy fidgeted for a moment. It was clear that she was not comfortable with what she wanted to say. "Being away from Earth and out here all alone can be very stressful," she finally stated her observation. "Mistress McKinsey had a bit of a breakdown, but my master was able to help her through the worst of it. No one was seriously injured and I believe that she has totally recovered."

Martha took Nancy's hands in hers, "I didn't expect you to betray a confidence, Nancy. I apologize for putting you in an awkward position."

"Now that you mention it, though, I recall Constance making some kind of remark about an event that she associated with having such a large and elegant residence."

Nancy was clearly conflicted. "I wasn't told to keep it to myself. I don't know if the incident was reported to anyone else, and you're the governor. Isn't it right for me to answer your questions if my master hasn't told me not to?"

"Yes, I suppose it is," Martha agreed. "Since you seem to think the matter is closed, I'll treat it as such unless someone else brings it to my attention. Thank you for your honesty and candor, my dear."

Martha waited until she got a smile from the distressed girl before releasing her hands and continuing into the transporter station.

The small cluster of people at the agricultural complex had moved down to the antechamber that gave access to the buried greenhouses. Nancy introduced everyone but the newcomers, apologizing for not remembering their names. Margret stepped up to complete the introductions.

Dr. Jason Brown led the group with Professor Naveen Avalareddy next to Governor Grayson. Nancy, Misty, and Margret followed with the new arrivals, Anton Deveraux and Jack Farrell.

There were some beautiful flowers in two of the pods, but the governor was clearly uninterested in the details of the crossbreeding and genetic alterations taking place in the rest of the pods. As excited as Naveen was about their progress he cut the tour short when he saw the governor's eyes glazing over. He led everyone upstairs to the central dome.

Bright sunshine was streaming through the protective glazing of the dome, which housed a beautiful office building and terraced gardens. The plants were protected from the ultraviolet radiation and toxic levels of carbon dioxide by a dome similar to, but smaller than the one protecting the courtyards around the governor's office building.

After admiring the landscaping for a few minutes, Martha complimented the designer of the building and grounds. "I understand we have you to thank for this beautiful facility, Margret. Is this the kind of work you did back on Earth?"

Margret shook her head, "No, Governor. Most of my jobs on Earth were designing austere manufacturing facilities. Being here has allowed me to explore some more creative and decorative structures."

"Please, call me Martha. I'm not used to be addressed so formally. I've always been entertaining in the background as my husband — sorry, my former husband — dealt with dignitaries. He's been an admiral for many years.

"The simplicity of these domes is inspiring. The framework looks like stone, but it's seamless."

"The domes are the work of Mistress McKinsey. The frame actually is solid granite. It's one of the great things about designing for replicator technology." Martha could see the pride in Margret's expression as she added, "My sister concubine, Celeste, worked with Mistress McKinsey to develop software that converts CAD drawings and material specifications into data files acceptable to replicators."

"I was told that replicators can't produce anything that they haven't scanned," Martha remarked.

"So were we," Margret replied, "but, we didn't accept that limitation."

Martha laughed, "I'm going to like it here!"

After the group was silent for a few moments, Anton asked, "Is it possible to see the lake Margret described earlier?"

Martha looked thoughtful. "Would that be the lake formed from the discharge of excess water from the pumping station?"

Margret smiled at the governor's knowledge of the systems that had been installed and nodded as she said, "Yes. It's quite a ways to the south and there's no transporter nexus, but it shouldn't take long for Nancy to fly us there."

Nancy reached for her oxygen mask. "I'll be right back with some more breathers."

Naveen stopped her with, "I have enough for the four of us in my office. Didn't you bring four in with you earlier?"

Nancy nodded at Naveen as she lifted the four she had brought from the shuttle over her head. The two of them distributed the masks and demonstrated how to use them. When Nancy was satisfied that everyone was comfortable with the masks she led the group through the airlock that opened onto the surface of Azahar. The three new arrivals, including Governor Grayson, gasped when the outer airlock door opened to the hot, heavy air of Triton.

"My goodness it's hot outside!" Martha exclaimed.

"Yes, and it'd be worse if there wasn't any sulfur dioxide to reflect some of the heat back into space." Margret noted. She pointed to the first of the larger domes to be connected by an enclosed path to the central dome. "These larger domes will be used to expand the experimental gardens into a larger facility that uses natural illumination. The glazing will block a good bit of the damaging ultraviolet wavelengths, though. We have a few airborne ozone generators in the upper atmosphere, but it will be many years before the UV is controlled that way."

Everyone buckled into the shuttle as Nancy raised the ramp and checked the seal. It took a minute or two for the shuttle to oxygenate the inside air enough for everyone to remove their masks and another couple of minutes to cool the interior to a comfortable temperature.

As soon as they cleared a small hill Martha asked, "What on earth is that massive structure? It looks like ruins from a lost civilization."

Margret chuckled, "Firstly, it's on Azahar, not Earth," Which earned her a good natured scowl from Martha. "Secondly, it's not ruins; it's under construction."

"We will field-test our corn there," Naveen explained with the enthusiasm of a teenager. "The completed dome will house a 700-acre field. It will limit the carbon dioxide content to a level that most corn can tolerate. We will have instrumentation that measures the oxygen in the intakes, the oxygen being added by the machinery, and the oxygen being

discharged from the facility. We will be able to get a good measure of a crop's ability to oxygenate the atmosphere."

"These structures won't be completed for at least a year," Margret added. "And they'll have other uses if Professor Avalareddy's experiments don't live up to expectation. Sorry Naveen. We're holding onto happy thoughts, but this is a big investment.

"Like the Professor said, the massive steel and glass dome will enclose seven hundred acres. Its thinner glazing will allow a higher percentage of ultraviolet light through, but the primary purpose of the dome is to reduce the carbon dioxide concentration for the initial strain of carbon-dioxide-tolerant hybrid corn. Oxygen generators around the perimeter of the dome at grade level will moderate the carbon dioxide content as the planetary atmosphere circulates through the dome.

"You can see the base of a colossal cooling tower rising from the plain less than a kilometer from the dome. Even with a good bit of air circulation through the big dome the solar radiation striking it will turn the inside into an oven without a place to pump all that heat. There are several 1,000 horsepower compressors planned for the ammonia engine room that will provide chilled glycol to the dome's air handlers for cooling the interior. I think that there'll be far more oxygen produced by the replicators in the cooling tower and air handlers around the base of the dome than by the greenery inside, but regardless of the source, several hundred tons of oxygen will pass through the adjustable iris at the apex of the dome every hour.

"An ozone generator isn't needed for the cooling tower's primary functionality, but it's a convenient place to mount a replicator that converts carbon dioxide into ozone. When the tower goes into operation it will discharge several tons of ozone every hour and the hot, moist air should take that ozone up to very high altitudes."

"Well," Martha commented with a big smile and a small chuckle. "This answers my question about plans to terraform Azahar. Sounds like you guys are thinking outside the box again. The corn will not only add oxygen to the atmosphere, but will also add high quality starch and fiber to the recyclers."

It didn't take long for the shuttle to make the trip to the coast, especially when Misty convinced Nancy to trust the instruments instead of landmarks allowing them to fly very high and very fast before descending as they approached the coast.

After flying the length of the lake, Anton asked to be let out of the shuttle at three locations where he took both water and soil samples from the deepest and shallowest parts. He was very concerned about the temperature readings.

Back in the shuttle he made notes after drying off and putting his clothes back on. "The water is much too warm for carp," Anton observed.

"I can add a cooling unit in the discharge pipe," Margret offered.

"Hum, what's that?" Anton remarked, absently indicating that he wasn't really speaking to be heard.

"The water entering the lake: I can cool it before it splashes out of the pipe," Margret repeated the offer. "Cold water will hold gasses longer than hot water. That will allow it to retain more oxygen as well, although it loses a lot of gases as it tumbles over the rocks. Raising the dam will reduce the ratio of water mass to surface area which will also slow the percentage of carbon dioxide from the atmosphere exchanged with the oxygen in the water."

"True, but the splashing adds a bit of carbon dioxide to this end of the lake," Anton added. "I'll know more when I analyze these samples."

Martha was very pleased with what she had seen. The small team of botanists seemed to have everything they needed to continue their progress. It was certainly an area she could afford to ignore for a while.