

A MOTE IN SHADOW



A.N. ALEX

A Mote in Shadow © 2024 by A.N. Alex is licensed under CC BY 4.0.

To view a copy of this license, visit

<https://creativecommons.org/licenses/by/4.0/>

You are free to:

1. **Share** — copy and redistribute the material in any medium or format for any purpose, even commercially.
2. **Adapt** — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

1. **Attribution** — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.
2. **No additional restrictions** — You may not apply legal terms or [technological measures](#) that legally restrict others from doing anything the license permits.

“Anchuan Shiyong” [Safe Handling]

A Traditional Martian Benediction

Key coremye te nosu, key portu te prafomu.

Wi gah dachi gadhah.

[From stern to bow, from port to starboard.]

[We fly.]

Fizz yet lul wi hahdah;

Posadkea una gah gahdah; awa wonda bin gbam.

[Taking off, we soar;]

[Landing, we arrive; our journey complete.]

Na ehkeypaza gah togetha tey dey;

Tey-tey anchuan shiyong lul am bin dey.

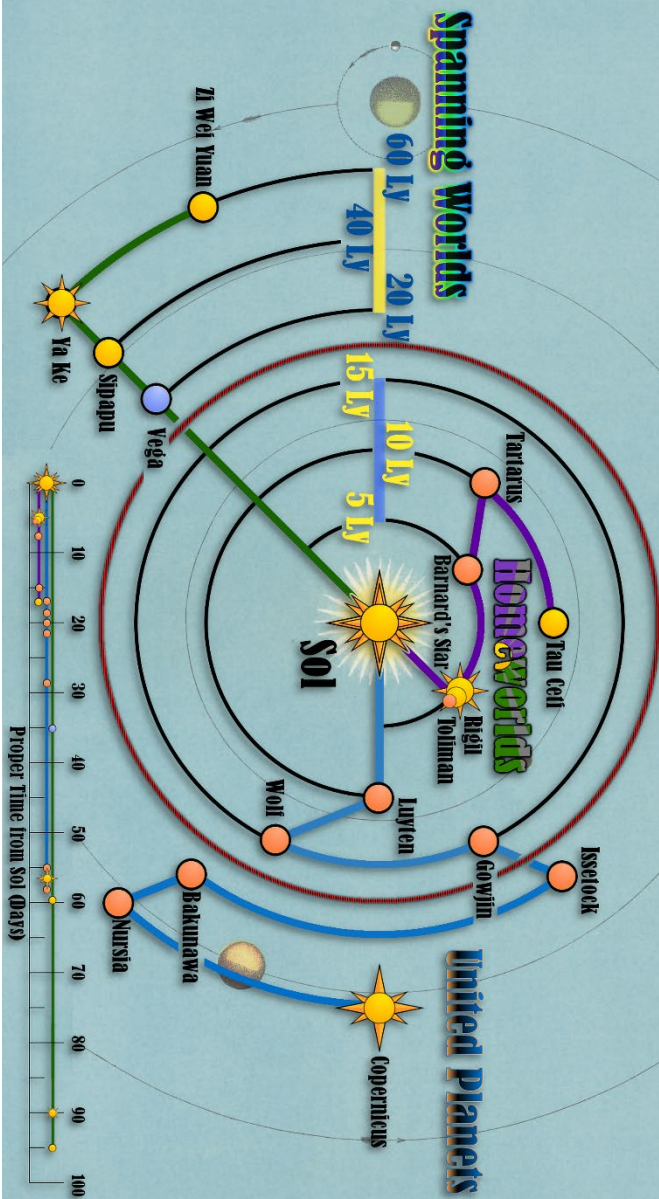
[The crew, together, in past and future meet;]

[Eternally vigilant, we will be safe.]

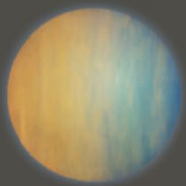
Na all gah til andyanleyu kes fo bin tak.

[Till abyssal currents have their claim.]

INHABITED SPACE



MOONS OF JIN



JIN

Jin
Star: Ya Ke
Type: Gas giant
Exclusion Zone: 1.171 Gm
Population: 24.02 mil.
Moons: 79 (7 primary)



Skarda

Fourth Moon of Jin

Gravity: 0.26 g
Population: 8.52 million
+2.05 million on orbit
Cosmodromes: Arco lazuli, Tay Jinchang,
Nova Chuanwu, Portu Grond



Vas

Third Moon of Jin

Gravity: 0.34 g
Population: 7.30 million
+1.75 million on orbit
Cosmodromes: Vas Central Cosmodrome,
Infernis Planitia Cosmodrome



Plomo

Fifth Moon of Jin

Gravity: 0.21 g
Population: 1.82 million
+0.39 million on orbit
Cosmodromes: Anchuan Hefushe, Arco Sweet Water,
Bul Aqua Archbeam



Suseong, Peng, Kobber, Prata

Jin's population primarily resides on one of the three primary moons (Skarda, Vas, or Plomo) with the remainder either on orbit in stations like Horizon's Edge, or on the remaining primary moons with the exception of Prata which is heavily irradiated by Jin's radiation belts and is entirely uninhabited.

IKSA CT-185 “El Cajon”

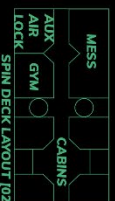
Introducing the IKSA CT-185 “El Cajon,” a revolutionary spacecraft that puts the power of space exploration in your hands. With IKSA’s classic additively manufactured schematic, you can print and assemble your very own El Cajon, customizing it to your specific needs. This DIY approach not only saves you resources but also allows for a deeper understanding and appreciation of your spacecraft.

The El Cajon offers a spacious 14.83 m³ of active space per crew, ensuring comfort during long journeys. With a stowage capacity of 4,300 food days and a Bio-Life Support System (BLSS) providing 6.5 food days of support, you can embark on extended missions with confidence.

To complete your El Cajon, IKSA provides you with a state-of-the-art fusion drive and licensed transporter, enabling efficient hybrid propellant fusion-driven propulsion. The convenient “full craft” spin-up design allows for versatile gravity control, making the El Cajon well-suited for operations at 30%, 60%, or 36% of standard spin-gravity.

Experience the pride and satisfaction of building your own spacecraft while benefiting from IKSA’s cutting-edge technology.

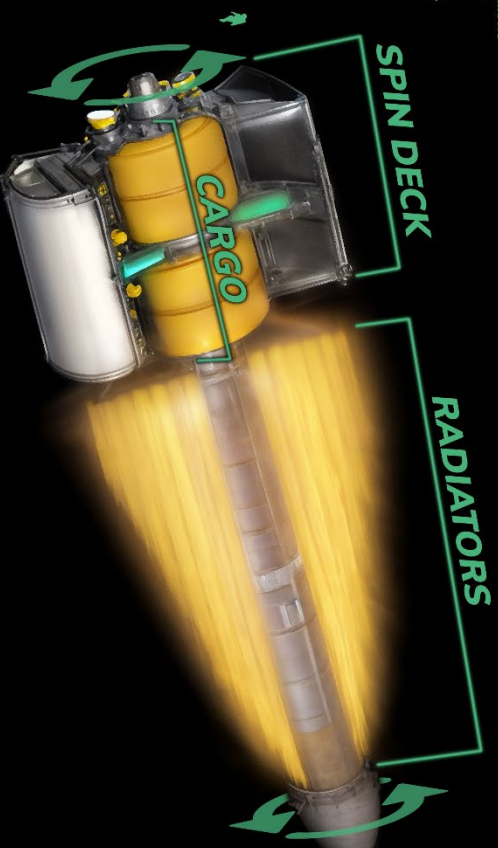
SPIN DECK LAYOUT [01]



SPIN DECK LAYOUT [02]

Iktomi Space & Aeronautic Licensed Spacecraft Schematic

148 dry tonnage | 80 tons cargo | 105 tons bioprop
max accel. 1.91 m/s² | ΔV 44.23 km/s



The CT-185 “El Cajon” is your gateway to the stars,
offering unparalleled customization, comfort, and performance.

Table of Contents

Table of Contents	7
--------------------------------	----------

Book One: Ergo Infinitum	10
---------------------------------------	-----------

Chapter One	10
-------------------	----

Chapter Two.....	16
------------------	----

Chapter Three	35
---------------------	----

Chapter Four	51
--------------------	----

Chapter Five.....	76
-------------------	----

ONE PAGERS [PERSONAL USE] EYES ONLY.....	92
---	-----------

[01] CHARTS, MAPS, AND DIAGRAMS	93
---------------------------------------	----

[02] PERSONS OF INTEREST	97
--------------------------------	----

Arad, Taliya	97
--------------------	----

Blanco, Isabell [Ninya Blanca]	98
--------------------------------------	----

Chen, Anya Luciana [Copper Wing]	99
--	----

Cordova, Nyghel [Green Dragon]	100
--------------------------------------	-----

Daniels, Ty	101
-------------------	-----

Devi, Ami	102
-----------------	-----

Flores, Liam	103
--------------------	-----

Garcia, Roderick.....	104
-----------------------	-----

Harris-Walker, Angelo	105
-----------------------------	-----

Ibrahim, Azikiwe [Smiles]	106
---------------------------------	-----

Jakande, Peter [Mimo]	107
-----------------------------	-----

Johnson, Luca [Hammerhead]	108
----------------------------------	-----

Jones-Diaz, Ai [Betty Blue]	109
-----------------------------------	-----

Juhasz, Io Park	110
-----------------------	-----

Kim, Chul-soon [Joker One]	111
----------------------------------	-----

Kim, Kirk.....	112
----------------	-----

Larsen, Hakon	113
---------------------	-----

McBride, Michael [Gray Top].....	114
----------------------------------	-----

Murphy, Ciara [Pele]	115
----------------------------	-----

Nguyen, Anna [Red Cap]	116
------------------------------	-----

No, Chaeyoung.....	117
--------------------	-----

Obialo, Charles	118
Obialo, Diya.....	119
Obialo, Frederik [Eff].....	120
Ocampo, Margel	121
Patel, Melisa.....	122
Peyton, Ali.....	123
Qureyshi, Sania	124
Sato, Luiz	125
Silva, Vis-viva [Vis].....	126
Tsai-Adeyemi, Edouard.....	127
Vasquez, Chris de Laval	128
Zhang-Zidane, Gazala	129
Ziu-Ortiz, Omolara	130
[03] COMMON TERMS	131
<i>Acceleration Flat</i>	131
<i>Arte Steh</i>	131
AlKapThil	131
Biosuit	131
<i>Celarium</i>	131
CHOMP	131
Cooperative Defense [CADSS].....	132
<i>Cut Knife</i>	132
Delta-vee.....	132
<i>Di Lingua</i>	133
EAR	133
Earth Reckoning.....	133
ERR-AL.....	133
<i>Gidizip</i>	134
<i>Grond Steh</i>	134
Homeworlds Federation.....	134
HEAT BRACE.....	134
IBIS	135
Ink Display	135
K-tube/K-station	135
Propcan	136

Rihanarchia, Rihanarchism, Rihanarchist, Rihanex	136
Seal/Seal Codes	136
Spanning Worlds Independence.....	137
Sol Universal Time	137
<i>Stellah Steh</i>	137
<i>Swawn</i>	137
Tonn	137
United Planets.....	137
Upblanda	138
Upper.....	138
[04] QUALS: QUantum Algorithmic Ledger System	139
<i>About the author</i>	141

Book One:

Ergo Infinitum

Chapter One

[66036] Isabell

Otso Station

Isabell's mind buzzed with a static crackle as her synapses fired—hot and fast like snaps of lightning in the raging storms of Jupiter. Cloaked in a demonic visage, in an alleyway at the edge of Arcas station, high above the surface of Calisto, in the Jovian system, she hid behind something deeper than a shadow. Her obsidian black armor was sharp, angular, violent, and hid her face beneath a monochromatic Oni mask.

Everywhere she looked, she saw green and purple flags, emblazoned with the rising stars motif—the war flag of the Homeworlds. For the hedonistic crowds drawn to this district, the symbol implied the faintest edge of social and political menace. They came here for a perception of peril only, just a little edge of excitement, and that amused Isabell.

Her modified cold gray eyes saw their truth. This was not a place of danger, not really. It was a thoroughly gentrified section of a station in the heart of the Solar system, plastered over with empty signifiers of danger.

The flags around the district were nothing save a mere marketing ploy, designed to draw people to a sad little district tucked between the more stable habitats and the station's superstructure. These crowds were being exploited by the most cynical of Homeworlds refugees displaced during the war, and the crowds deserved it.

Isabell was different. She was here for a righteous mission. And she prepared herself accordingly.

VIPs have arrived.

Isabell subvocalized with a growl across her quantum encrypted communications system as her eyes tracked two Martian scientists entering the district. For these lanky Martians draped in traditional shawls, the danger in the district was very real.

Sitrep.

We're in position, Ninya Blanca.

The hisses of her operators sounded like whispers just behind her ear.

OPFOR shuttle is in our scopes. Ready to follow your lead.

She heard the tension in their voices. She heard their unanswered questions in the pauses between words. Contracted to

protect two scientists—critical research assets for the United Planets Navy—her most elite operators of Grayson Services Group puzzled why they had allowed an abduction attempt to get this far?

Grayson's intelligence officers had discovered an Acheron plot weeks ago. An obvious honeypot trap sprung through an invitation for the scientists to spend a night out in this district. An invitation sent by a known Acheron operative whose team was well prepared to grab the two Martians.

Yet Sato had ordered his cell, Isabell's unit, to allow the plot to unfold, at least partially. Wouldn't we lose face? Wouldn't we lose our contracts? These were the questions that had gone unspoken in the minds of her operators.

"Conditions for Grayson maintaining control of the Martian's project are unfavorable," Sato said. "And there's no reason to expect that to change—unless we force the issue. We must act to align the project with our interests. We cannot afford to sit idly by and merely hope for the right conditions to develop."

There was no reason to doubt his judgement. He remained embedded in the United Planets Navy. He would know how to manipulate them the best. And he was Isabell's mentor, besides.

She tracked the Martian scientists as they entered the large open space at the center of the district. Her targets headed to a bar ten or so meters away from the alley where she lurked, across an open

common space with a gnarled oak tree in the center. A green-haired woman waved the two lanky Martian scientists over to a table at the bar's open patio. With bows exchanged in the Martian fashion, the scientists approached the table.

Danger close, Isabell announced to her team.

Drinks ordered. Words exchanged. The trio's socialization dragged on, and the crowds thinned as the hours passed. Around 01:04, station time, the female Martian scientist, Dr. Silva, said her goodbyes and left the Acheron Operative with the hapless Dr. Jakande.

Escorting Silva, Isabell's operators announced.

Understood.

Her adversaries' digital chatter increased over surveilled channels. Crowds in the public spaces had thinned to the point of non-existence. Tension in Isabell's body increased.

Her fingers in her left hand splayed out. Sharp blades in the gloves of her armor extended as her fingers spread wide like the claws of a cat. She pulled out her coilgun machine pistol's grip, and with a thought, the weapon unfolded and attached its exoskeletal brace to her right forearm.

Beneath the jet-black portholes on her armored demonic faceplate, she watched the green-haired adversary lace Dr. Jakande's drink. Within a minute, he was swaying and violently stumbling up from the table. The green-haired adversary lured him to the water closet in a

side alley next to the bar, where Acheron planned to spring the trap. The hostile operator's accomplice, built like a tank, was ready for the last acts of the abduction just outside the main water closet. In a flash, the green-haired operator was behind the Martian scientist, gun pressed to his ribs.

Go!

She growled the order as she burst through the metamaterial metaflage that had hidden her in her alley. Like a lenticular lens, the metaflage shifted the frequencies of her light and heat in a chaotic dance, hiding her from both human and autonomous snoops. Against her exoskeletal enhanced strength, the metamaterial broke apart like ink display paper.

In three heartbeats she was across the wide-open space, past the gnarled oak tree, and in the alley with Jakande and his would-be abductors. The operator rippling with muscles and mass noticed her and shouted. It was too late.

Snap snap snap. Isabell's hypersonic rounds crackled through the alley like a laser beam. Brilliant red tracers, bright enough to cause remnant phosphors in unprotected eyes, shot out from Isabell's weapon attached to her right arm. The large Acheron operator's upper torso was a mist of blood and bone exploding outward. The green-haired operator turned and took aim with her sidearm.

Pop pop. Valiant effort, but the projectiles exploded against the metal plating where Isabell had been milliseconds earlier. Isabell had already launched herself high into the air. Clawed arm reached back.

Whoosh. She swiped forward with her left hand as she landed on her knees. Pressure emanated from her fingertips in midair. Then something warm and wet spilled across the haptic skin in the palm of her glove.

Shuttle secured Ninya Blanca.

Understood.

Isabell stood and flicked some of the blood off her claw blades, retracting them back into her gloves. With a thought, her demonic faceplate split in half, retracting the top-half as her demon's smile remained in place over her chin. She stared down at the stunned and drugged Martian scientist, tried to smile warmly with her eyes as their artificial steel-gray glow got brighter. A whirlwind of air pressed against her body. There was a roar of wind rushing out of a habitat breach. Warning klaxons and yellow emergency lighting filled the district.

"Don't worry, Dr. Jakande!" Isabell screamed over the cyclone of depressurization. "I am with Grayson Services Group. I am here to protect you."

For now. She thought with a cruel and hungry smile beneath her mask.

Chapter Two

[66255] Chaeyoung

Celosia

Chaeyoung hunched over a glassy copper-green mug half-filled with brown bitter drink, pressed down by the weight of history as she sat at a lonely table in the *Di Polyeznaya*. She was making her best efforts to drown her indecisiveness in the alcoholic soja. After all, it was all the way from Sol.

Two hundred years of sustained human effort and now there were thousands of bars like *Di Polyeznaya*, sixty-four light years from Earth, where people got drunk instead of boldly exploring the unknown. Hot, dusty, and crowded but quiet. Her thoughts were the loudest thing in the room, and she was utterly alone with them.

In Tiantang, the largest city and capital of Celosia, there were many bars she could have gone to that would yield a more complete distraction from herself, but *Di Polyeznaya* was unique. *Stellah steh*—a Martian description of people born in the Solar system but not on Earth or Mars—came to bars like *Di Polyeznaya* to ease their homesickness.

Chaeyoung's was here seeking to recapture that feeling she had as an optimistic student studying in Sol—her first time out of the

Spanning Worlds—but the intervening years had changed her too much. Wallowing in nostalgia made it inescapably obvious just how frustrated she had become with her career.

Now she was not only wallowing over impending decisions, but she was also mulling over what could have been. Not simply for herself, but even for those dreams that had brought her ancestors out to the Spanning Worlds. Faced with all that history, her own contribution to the sustained human project seemed inadequate.

Pinned in a corner at the edge of a bar top, sitting on a high stool, surrounded by strangers, she rested her elbows against the cool ceramic table. Her nose tickled by the astringent medicinal aroma of her alcoholic drink. The other patrons tightly packed around her like passengers in a high-acceleration metal bucket rocket, or a propulsion can. As the name suggested, there was little room to move in a propcan.

She lifted her cup to drink, letting the brown soja burn at her throat and nose before she halved its remaining content, and set the cup down as gently as if it might crumple from its own weight against the bar top.

A long day of conference talks on astrobiology had worn her down, caused her thoughts to run, trend toward the moody. Her fellow exobiologists all believed in the standard line of a universe filled with

self-sterilized oxygen-rich planets like Celosia. Victims of their own abiotic oxygen production.

Oxygen denied complex life any chance to take hold. Across the Local Bubble, this process had decidedly left worlds ideally suited for humanity. But, in Chaeyoung's opinion, exobiology had stalled out similarly—killed by the field's own oxygen hypothesis. All other ideas denied any chance to thrive.

Exobiologists had spent the last century focused on searches for unusual microbes within settled systems, studying the fossil traces in Ahtash's lithium deserts, and protecting the pre-biotic Europa chemistry. These were interesting fields of study, but they never held Chaeyoung's attention for long.

She had always worked on these projects as a placeholder so, someday, she would go out into the vast unexplored space and see what was out there. Each step she had taken, from completing her degree, working as a postdoctoral researcher on Ahtash then Europa, and securing a more permanent position back home in the Spanning Worlds, was justified on the hope that she would finally have enough cachet and seniority in the field to look for life in new places. Unexplored places.

Four years after her graduation from Huygens University, the only people who had shown even vague interest in listening to her dreams were representatives of a private defense contractor, Acheron

Private Capital Group. Acheron had a reputation as freedom fighting heroes, or cynical warmongers and profiteers depending on who you asked, but they heard her talk at the conference and wanted to hear more. Everyone else in her audience had been friends, showed up to smirk at her presentation, or just needed a place to catch up on their own work while dodging social obligations, but Acheron's nameless representatives had shown genuine interest, and wanted her to give a private presentation tomorrow.

Chaeyoung's friend Sania said there was an implied funding opportunity. She had mixed feelings over that possibility. Her postdoctoral fellowship was ending soon, and she could renew her contract but only if she joined a team that had openly mocked her most recent talk, leave the field, or take Acheron seriously and take money from a weapons manufacturer.

Instead of making any kind of decision, she was getting drunk. Procrastinating until her friend Sania would inevitably demand a yes or no about tomorrow's meeting. By then, hopefully, she would have found some distraction and made the final decision on a whim, consequences be damned.

She took another sip of her drink and looked around for someone to help her crawl out of her own mind. Next to Chaeyoung was a beautiful stranger with skin like warm Martian clay on a dusty day, dark hair in a high bun, wearing a brilliant light sleeveless red dress with

a plunging back revealing extensive *stellah steh* tattoos. Splashes of geometric shapes, abstract lines reminiscent of mathematical scripts or some unknowable language, with crisp spacing, all in a beautiful ruddy violet colored ink spiraled over spine, shoulders, and curled along the contours of toned arms.

Chaeyoung wanted to be noticed and approached by this beautiful stranger, but she was a *well steh*. She was born on a planet with a terrestrial atmosphere and was, in many ways, a local. This justified her hesitation. Politics with Uppers—people from the United Planets—could complicate matters. Complicated was the last thing she wanted right now, though this may be a different kind of complication. The allure of the stranger was distinct from everything she was actively avoiding.

“Fuck it,” she muttered to herself.

With one last gulp she finished her *soja*, turned to face the stranger, and showed off a little with a *Di Lingua* greeting—the shared language of the *stellah and Grond steh*.

“*Hao fa!*”¹ she happily greeted the stranger in *Di Lingua*.

The stranger spun on the chair to face Chaeyoung. They had a slim heart-shaped face, deep-set eyes with a single sweep of dark black makeup on their upper eyelid, soft arch eyebrows, bow-shaped lips, and

¹ [*Di Lingua*]: Hello!

eyes that were like dark brown pools of void with glints of orange from the overhead light in the bar.

The stranger was tall, even while sitting, and had to hunch over to make eye contact. “*Yu gah mi ill tok?*”² the stranger asked with a flat affect.

“*Ye. If yu gah jaw lul may wahala dey, A gah maiself kes tok.*”³

Chaeyoung set her mug down, then waved her open palm exaggeratedly to signal her sincerity—she would not talk to someone who was uninterested.

“No, that’s fine,” the stranger gave her a sly smile. “Not a lot of *dichu pipol*—locals—come into this bar. You speak *Di Lingua* like you’ve lived there. *Yu gah wey bin steh?*”⁴

Chaeyoung looked at her hands for a moment as she blushed, mostly from inebriation, then held the eyes of the *Grond steh*, responding and coyly brushing a strand of hair away from her face. “*A gah Sol bin eight haif nyan, but Ya Ke ill bin ste. A gah mot wel tok lul tink.*”⁵

“What brought you to Sol?”

² [*Di Lingua*]: Are you talking to me?

³ [*Di Lingua*]: Yes. If that bothers you, I can talk to myself.

⁴ [*Di Lingua*]: Where are you from?

⁵ [*Di Lingua*]: I lived in Sol for eight and a half years, but I am from Ya Ke. I don’t think I speak it that well.

"I was a student at *Dayhagyo gah Huygens*.⁶ Studied AXB—Astrobiology, Xenobiology, and Biochemistry."

The stranger raised an eyebrow. "Huygens University is a nice place. Did you live on Titan the whole time you were in Sol?"

"Not the whole time," Chaeyoung shook her head. "I lived at the research base near Europa for some of it."

"*Nawa oh!*"⁷ the stranger looked genuinely impressed and sounded wistful. "I can't imagine what it's like to visit a place like that. Almost entirely untouched by us. It must be wonderful."

"It was," the corners of Chaeyoung's mouth curled into a smile.

"*Yu gah wetin lul name get dey?*"⁸

"My name's Vis. *Na yeoja*,"⁹ Vis said with her hand out, taking care to place her palm up it so her *stellah steh* gesture was clear.

"*Na yeoja gah Chaeyoung lul name get dey*,"¹⁰ Chaeyoung said with a gender-specifying particle and a smile.

Vis bowed her head politely, lifted her mug, frowned, and set it back down.

"*Am hey empty dey?*"¹¹ Chaeyoung asked.

⁶ [*Di Lingua*]: Huygens University.

⁷ [*Di Lingua*]: Woah!

⁸ [*Di Lingua*]: What's your name?

⁹ [*Di Lingua*]: This woman.

¹⁰ [*Di Lingua*]: This woman's name is Chaeyoung.

¹¹ [*Di Lingua*]: Is that empty?

Vis tilted the mug and Chaeyoung saw it was indeed empty. She raised her hand to get the attention of the tender by bringing her fingers toward her palm in a *stellah steh* motion that looked a bit like one hand clapping. The blocky autonomous bar manager stumbled over as large expressive plates on its blue-tinged faceplate bent and flapped in some poor imitation of a polite smile.

"Yes, how may I help you, *ohlowyeh*?" the tender asked with a dual gender fluctuating voice most autonomous systems from Sol used.

"Two more of what she was having," Chaeyoung pointed at Vis's empty drink.

"Yes, *ohlowyeh*. Here is your order. It will be ten *bah-kay* or eleven point two nine *swawn*. Shall I add it to your tab?"

"Ye, *oke*."

The tender raised an arm, pinched as if it had just grabbed something unseen in the air, and then pressed whatever invisible thing it was toward Chaeyoung before it released its grasp. A semi-transparent window emerged before her with an external and urgent authorization request to add the charge to her biometrically sealed bar tab. Implants near her optical nerve connected to the ambient information network and then rendered an interactive display that only existed in her occipital lobe. It was a user interface produced by her Extraocular Augmented Reality, or EAR, implant.

As her focus shifted across the face of the virtual window, there was a tingle in her fingertips. Haptic feedback. She idly consented to the bar order. Then she pinched the semi-opaque window in her hand and gently passed it back to the tender.

As that EAR window disappeared, Chaeyoung caught a flash of motion. There, in the corner of her EAR, was the dancing icon of unread messages. She waved her hand in front of her face and the entire EAR interface closed out so she could ignore whatever message Sania had no doubt sent.

"Very good *ohlowyeh*," the tender nodded its faceplate as it carefully picked up Vis's mug, filled two more empty mugs with a milky white tonic—taking care to support each hand at the elbow in a *stellah steh* politeness gesture, and then passed the mugs to Vis and Chaeyoung. "Enjoy your drinks. *Gbam!*" the tender raised up a thumb.

In tandem, Vis and Chaeyoung picked up their full glasses in their right hands, lifted them with a slight tip of the brim to the tender with their free arm over their abdomen in a signal of politeness.

"*Gbam!*"¹² the pair said in unison, tapped lips of mugs gently, and took a sip.

Chaeyoung coughed.

¹² [*Di Lingua*]: Cheers!

Vis laughed. "This is strong Pluto distillate. You should be a little careful."

Vis reached out, touched Chaeyoung's forearm, letting her hand linger. Chaeyoung's face flushed. She looked down at Vis's hand as it pulled away, saw the tattoo ink on Vis's arm was over slightly raised bumps of scarification.

"I've had nothing like this. What is it?" Chaeyoung asked.

Vis lowered the cup and responded delicately. "In Upblanda it's called Plutonian white wine, but in *Di Lingua* it's *nokcha soja*. It's a *soja* distilled from *nyams*, but it has a sprinkle of ginsenosides in it."

Chaeyoung recognized ginsenosides as in ginseng, an Earth plant that has had some mild cultivation success on Mars and the outer Solar System.

Chaeyoung raised an eyebrow. "Ah, that explains the flavor. Must make it fairly special."

"Ye, it's a rare specialty from Pluto."

Chaeyoung raised an eyebrow. "Aren't you...*Grond steh*?"

She nodded her chin toward Vis's tattoos. These were not *stellah steh* tattoos as she had first assumed, these were signs that Vis had extensive musculoskeletal supports and implants to strengthen her body. These were telltale signs that someone had grown up in one-third Earth standard gravity, especially with tattoos which called attention to the medical implantation's presence.

Martians—*Grond steh*—had developed the practice of beautifying themselves while proudly displaying how Mars had changed them. When *Grond steh* built the ring habs and stations that were plentiful in the rest of the Solar system, they had created habitats for millions to live in near-standard gravity—they had created the *stellah steh*. That obviated the need of the implants for many from a technological or medical perspective, but the *Grond steh* traditions of extensive tattooing were a cultural expression. And so, even without implants, *stellah steh* continued the tattooing practice. But the *Grond steh* still had the scars and the implants, beneath the ink.

Vis glanced at her left arm, that was covered in her intricate tattoos and nodded. “Ye, I am *Grond steh*, but I spent a little bit of time on Callisto and in the Kuiper belt.”

Chaeyoung’s eyes widened in excitement. “*Nawa oh*, what’s that like? The Kuiper belt?”

Vis shrugged, turned back to her mug, and looked down at the milky substance sadly.

“*Binu*, I didn’t mean to—”

“No, it’s fine,” Vis turned to Chaeyoung with a bright smile. “I just don’t want to talk about that.”

Vis’s body tensed, and Chaeyoung reacted empathetically. She hunched over her drink and there was a weight on her chest. She felt on the verge of abandonment, being left alone to wallow in her own

thoughts again. She sipped at the *nokcha soja* and saw the window of recovery from her misstep dwindling.

“You know you can actually consume too much ginsenosides,” she blurted out.

“Oh? Huh,” Vis raised an eyebrow and took another sip of her drink.

Chaeyoung nodded. “Ye, but I think...if this stuff is so rare,” she brought her mug up to her eye and inspected it suspiciously. “You might need to consume the entire crop on Pluto before it did anything noticeable.”

Vis laughed, almost spitting out the *nokcha soja*.

“*Jeje, eheen, anchuan shiyong*,”¹³ Chaeyoung said with a wink over the rim of her mug.

Vis swiveled back and forth on her stool as she looked into Chaeyoung’s eyes. As their eyes locked, there was a new tension between them.

Vis’s eyes, black as void, ignited into stars—brilliant cerulean blue orbs—as her EAR implants produced light beneath the surface of her irises. It was a purely aesthetic modification to basic EAR functionally, but it was stunning. For a moment, all Chaeyoung saw of the world were Vis’s enlarged pupils swallowed by blue accretion disks.

¹³ [*Di Lingua*]: Careful, sweetie, safe handling.

Chaeyoung had to look away, eventually. “So,” she said as she looked at her *nokcha soja*. “How has Celosia been treating you?”

“I threw myself into work since I arrived,” Vis curled both hands around her mug with a demure smile sent Chaeyoung’s way. “But with the end of the term, things are looking more exciting.”

“Term as in school term?”

“Ye. I am a *gyosa*. A teacher.”

“What do you teach?”

“Physics—I used to work on ERR—AL physics. Mostly theory—computational—and some applied.”

Despite being impressed, Chaeyoung kept it cool. “Do you like teaching?”

Vis shrugged with her hands. “Ye, it’s more like fine-tuning autos than interacting much with students. They do most of their group work as I supervise and troubleshoot. So, I feel more like myself when I’m not teaching.”

Chaeyoung wondered out loud. “So...what are you, when you’re being yourself?” then she gave Vis a mischievous smile and said flirtatiously. “*Oda than A gah baire gyosa ill see?*”¹⁴

Vis rolled her eyes but giggled with a flare of blue in her eyes. “*Shey, oke. Eheen, slo slo gahdah.*”¹⁵

¹⁴ [*Di Lingua*]: Other than this white-hot teacher I am looking at?

¹⁵ [*Di Lingua*]: Yeah, okay. You’re moving fast, sweetie.

Chaeyoung blushed and turned away to watch the cloud-like formations in her mug as she swirled the *nokcha soja*.

"*Na am hey baze baze mot bin dey*,"¹⁶ Vis reached out and squeezed Chaeyoung's hand. "I'm still trying to find myself out here...ever since I switched careers and left Sol behind...but I enjoy dancing, and I always loved plants. I enjoy tending to my little garden in my hab," Vis laughed. "It gets a bit neglected when I get busy during the term, but it's all made with hardy plants and I was agronomy certified in another lifetime."

"I heard dancing? There's a nice *jip olodo* in this district if...if you're interested," Chaeyoung suggested nervously.

Vis's eyes got a little bluer, and she stared out into the distance like she was focusing on something in her EAR windows. "What's it called?"

"Axis Mundi."

"Ah ye, I think I've heard of it. Is it on the waterline?"

"Ye, that's the one."

Chaeyoung pointed at Vis's drink.

Vis shook her head. "I'd like to keep my head, for now, *ehéen*. Maybe we could go dancing later?" she sounded hopeful.

¹⁶ [*Di Lingua*]: It wasn't not hitting the mark.

"*Na gah pinleyu wetin dey?*"¹⁷ Chaeyoung brought her EAR back up and made little circles in the air with her hand sending a request to exchange EAR frequencies—or more accurately coordinates to send messages across any network—and then flicked the request to Vis.

"You're going to keep this information safe, right?" Vis asked as she swiveled on the stool.

Chaeyoung put a grave look on her face, put a hand over her heart, and bowed as if she was accepting some great honor. "Ye, of course. *Anchuan shiyong*.¹⁸ I will guard your EAR with my life. I swear."

Vis laughed and accepted the exchange. "Good, good! I was going to meet some friends tonight, but after they show up, head out to Axis Mundi?"

Chaeyoung nodded and lifted her glass to finish the *nokcha soja*. "*Gbam!*"¹⁹

Vis reciprocated. "*Gbam!*"²⁰

Chaeyoung and Vis chatted as they waited for Vis's friends. It turned out to be quite a crowd when four showed up, introduced themselves to Chaeyoung, and then they all left *Di Polyzenya* to go dancing at the Axis Mundi.

Outside, the Celosian air was frosty, as it often was in the

¹⁷ [*Di Lingua*]: What's the frequency?

¹⁸ [*Di Lingua*]: Safe handling.

¹⁹ [*Di Lingua*]: Cheers!

²⁰ [*Di Lingua*]: Cheers!

sprawling mega-capital city of Tiantang. Vis wrapped her shoulders with a traditional Martian shawl and a black long padding coat. Chaeyoung wore her usual long padding coat with the blue synth-fur lining.

*"Kacha bul!"*²¹ Vis said with wink. "Nice coat."

"Thanks," Chaeyoung smiled then offered Vis her arm.

Through cramped alleyways, the group of six wobbled along, Vis and Chaeyoung arm-in-arm. They walked along the top of the storm wall, almost four stories above the ground, looking out over the lattice network of aquaculture that stretched out for tens of kilometers across Tiantang bay. Chaeyoung's eyes watered from the bitter icy winds and the brilliant light reflecting from the glittering buildings of the Vermilion cape, or the occasional flash and *toom* of a distant rocket launch from the cosmodrome.

They had strayed far from the parts of Tiantang where it was common to see *stellah steh*, and the group drew side-long glances from some locals. Celosia had been Chaeyoung's home since she was a teenager, but between her earliest years spent Ahtash in the Vega System, and the nearly nine years in Sol, she felt self-conscious and alienated underneath the glares. Feelings exacerbated since she was a head, or more, shorter than Vis and her friends, though the group seemed unbothered, or in the least, their good mood seemed

²¹ [*Di Lingua*]: Ultimate fire.

impervious to the occasional hostile glance.

At Axis Mundi, Vis and Chaeyoung alternated between dancing, engaging in conversations, and drinking *soja*. They bounced between tender, to dance floor, to speaking areas where sound cones blocked out the loud thrum of the latest autonomously generated and human remixed music. They lost themselves in the flow of each other's company, barely noticing that Vis's friends had left them behind to go to another club hours ago.

"I'll be right back," Vis waved toward the public water closet.

"I'll come with you."

Chaeyoung lagged a few paces behind Vis as they stumbled to the water closet hallway through the thinning crowds. She absent-mindedly waved open her EAR, saw a flood of messages, and slouched against the wall of the hallway as Vis went inside.

Chaeyoung's childhood friend and colleague, Sania, had sent a flurry of messages about the Acheron Private Capital Group offer. This was what she had been dreading all night. She had to decide. Take the meeting or not. She glanced at the time on her EAR, groaned as she realized she could easily make the meeting and get some sleep if she left soon—she almost hoped she had missed her chance.

A pit formed in her stomach and her face flushed from embarrassment, but there was a warming confidence in her heart that

had been absent earlier in the evening. Chaeyoung waved up a reply on her EAR.

Tell them: "Look forward to meeting you."

Sealed and delivered.

She was momentarily dizzy as she stumbled into the water closet. Vis was alone, hunched over the sinks in front of the vanity mirrors. Her skin was wet with sweat and glittered in the fluctuating lights of the club. She was beautiful, but the reflection of her face seemed wracked with sorrow. Chaeyoung's chest tightened, and her eyes teared up sympathetically. The music was a soft throb subsumed by the pound in Chaeyoung's head.

As Chaeyoung approached, she lightly placed her hand on Vis's back, her palm feeling the raised bumps beneath ink. Vis tensed, saw Chaeyoung in the mirror, and relaxed. Chaeyoung then stood on the tips of her toes to bring her face closer and curled herself around Vis's back in a bear hug. Vis seemed to melt into Chaeyoung's arms. Vis slid around to face Chaeyoung and leaned into the embrace. Then hot breath was upon her neck, a tickle in her ear.

Vis whispered as she wrapped an arm around Chaeyoung.

*"Remember, eheen, anchuan shiyong."*²²

²² [Di Lingua]: Safe handling, sweetie.

Vis intimately traced the subtle scar ridge along Chaeyoung's left cheek with her hand as Chaeyoung traced the lines of scars along Vis's forearms. As Vis tracked Chaeyoung's thin cheek scar, she reached the deep ridge that split the left edge of Chaeyoung's mouth and caressed it tenderly. Vis's EAR mods pulsed with blue light, almost like a heartbeat, drawing Chaeyoung in. She put her hand over Vis's. They intertwined their fingers, and she leaned in to give Vis a warm and eager kiss.

Chapter Three

[66256] Chaeyoung

Celosia

Chaeyoung jolted awake on the public auto vehicle. She caught cold glances from her fellow passengers and somewhat nervous stares. People generally did not like sharing a public auto with a passed-out woman with whiffs of *soja* out-gassing from her jacket this early on a weekday. She could almost hear the judgmental murmurs from the commuter crowds. Her head was pounding.

“Ughhh,” she groaned.

With a flick of her wrist, she caught the time on her EAR. She had been asleep for nearly an hour on the PAV, taking her total for the night up to three and a half. A few more dazed gestures to navigate her EAR interface, and she had pulled up the PAV network map. The back-and-forth wobbles of the centipedal autonomous vehicle unsettled her stomach, and frustrated her efforts to see where she was on the map.

Violent cramps wracked her abdomen, along with occasional shooting pains of nausea. She hunched over her legs and stared at her boots to stave away the feeling—the EAR map followed her gaze.

When she realized where she was, she jumped up and shouted.

“Ah, fuck!”

She grabbed her bag and ran to the middle door. A clique of youths laughed—she wondered if it was at her sudden outburst of profanity. Chaeyoung shot them a scowl to rival the disapproving looks she had received earlier, then pulled her seal from the metal bracelet on her left wrist. Balancing herself against the handrail, she delicately tapped the red, maze-like, engraved end of her seal against a flat circular receptacle near the exit door.

“Stop Requested,” an autonomous voice announced.

Chaeyoung braced her head against one of the stabilization bars for standing passengers and burrowed her face into the blue synthfur of her long-padded coat. A jingle played over the speakers announcing the stops in Upblanda, and each of the four most common Spanning World dialects.

“The next stop is...Bukman History and Culture Park,” the auto said.

She shook with impatience and nausea as the PAV slowly scuttled to a stop. It paused, bent to the side of the walkway with a hiss, and the doors slid open. She squeezed through like air released into vacuum, then, like a *cut* knife, slid through the crowds waiting on the platform. She had five minutes to get to her talk, and she had slept through her stop.

Wind caught the unfastened flap of her coat as she ran. Brutal Celosian winds sliced down to her bone with a chill. In a handful of steps, she was shivering.

The PAV platform and surrounding walkways were two or three stories above the latticework of struts and walkways connecting the tall buildings of Celosia's capital city, Tiantang. Green walls covered most buildings, which kept warm beneath glittering spinel ceramic panels, making the buildings that boxed her in seem like a crystalline serpentine forest rising through the undergrowth tangle of metal latticework. And just like the root system of a veritable forest, the lattice a few stories below had commercial PAVs and rapid intercity transit systems which exchanged people and resources around the planet.

She wheezed for air, her head pounded, and her teeth chattered in the thin and cold atmosphere, but she had finally made it to the correct PAV stop on foot. A large sign above the station read "Bukman Institute of Biological Sciences," Beebs to the Celosian locals.

Chaeyoung wove a manic path through the throngs of people, reached the entrance, and burst into the main lobby. As she walked ahead, from a near-field transmitter on the lobby desk she pulled open her EAR navigation for the main Beebs building and followed the arrow that appeared before her. It directed her to a sealed security kiosk.

Without stopping, she pulled her seal out of her bracelet, pressed it into the receptacle, and let the rest of her body continue

forward. Her arm and seal became like a tether, and she was stretching it out as far as she was able.

Her body moving toward the glowing yellow sealed door. Just in time, the zero-knowledge proof system of sealing technology acknowledged her identity, beeped, and opened the door as her body made contact. She pulled her seal out in one smooth motion forward.

It was a practiced move that would not have paid off with even the slightest delay in seal verification, which was not infrequent. She took it as a good sign that she had not slammed into a closed door

Sania was waiting outside the conference room, impatiently waiting for Chaeyoung. She was not early, or late, but exactly on time, she told herself as she slid her bag into her hand and slithered out of her coat. Sania was in a neat professional dress suit that was monochromatic and simple—the contemporary standard of Tiantang fashion. In the natural light that filtered in through the windows along the hallway, Sania’s brilliant and rich copper skin glowed. Chaeyoung’s childhood friend urgently beckoned.

“Ah! Chae! *Sharmoota!*”²³ Sania cursed in an Ahtashian dialect as she retrieved a small bio-plastic packet from her dress pockets and jabbed it toward Chaeyoung. “For your hangover!”

“Thanks.”

²³ [Ahtashi]: Bitch!

Chaeyoung ripped open the packet with its metal O-ring zipper and downed the bitter white contents, which instantly fizzed in her mouth. She coughed as it went into her mouth and nose.

Sania clicked her tongue playfully. "Careful, Chae. You wouldn't want to choke right before our big break."

"Aren't they weapons dealers or something? I think they are fine with dead clients."

Sania clicked her tongue. "Chae. Take this seriously?"

Chaeyoung put her hands up. "Oke oke. I'll do my best."

Sania bowed her head. "That's all I ask...*oiya!*²⁴ One last thing...our audience looks *well steh*."

"Oke, so? We are both from Ahtash. That makes us *well steh too*."

"I mean...avoid the *Di Lingua*?"

Chaeyoung pulled out her portable computing block from her tan satchel and handed the emptied bag to Sania. "All the best—"

"Universities use *Di Lingua*. I think I've heard that before," Sania gave Chaeyoung an eye-roll and a smirk.

Chaeyoung looked down at the portable computing unit and picked dust from a cooling grating along its face. "I met someone last night," she awkwardly blurted out.

²⁴ [Spanning Words]: Hey!

“Tell me everything—just not now!” Sania smiled and opened the door for Chaeyoung. “For now, focus on the talk!”

The conference room was little more than a reclaimed classroom. Instead of an amphitheater design, or a central conference room table, or a setup for video streaming, it was a scattering of desks and chairs.

Besides a wall-covering reactive ink display, the room had desks organized into small groups, with each group having their own dedicated computer units in the center for various guided, human-in-the-loop, autonomous learning sessions. The hint that this was a conference room was the arrangement of the chairs, all facing the large ink display. Most seats were empty.

Chaeyoung took a breath and walked to the table nearest to the reactive ink display, set up her portable unit, activated it with a wave of her hand, and turned toward Sania. “I’m ready.”

Sania positioned herself between Chaeyoung and the audience, formally bowed, and introduced Chaeyoung.

“Welcome to our esteemed guests. As you know, today we’ll be hearing from Dr. No. She received her undergraduate degree in astrobiology, xenobiology, and biochemistry from the Huygens University at the Andiri Ring in 2361, Earth reckoning, and at once began her work on the Doctor of Philosophy degree in AXB that same year. Her time on Titan culminated with a two-year research project on the salt

plains of Ahtash in the Vega system. She graduated with honors from HU in 2364, Earth reckoning. She then worked for two and a half years on the Joint Earth Saturn Europa Astrobiology project, or Jay Sea—

“After a fortuitous opening among the research staff!”

The audience politely chuckled at Chaeyoung’s interjection.

Sania rolled her eyes but smiled. “As I was saying, she has been our most distinguished and—might I add—second youngest postdoctoral fellow here at Beebs since she started in 66165, Sol Universal. She also has the distinction of having the most tau time of the scientific faculty at Beebs. She’s well-traveled! Without further ado, I leave it to Dr. No.”

Chaeyoung looked at the gathered faces in the room. Besides Sania, there were six representatives from Acheron Private Capital Group. All smartly dressed in fashionable masculine formal wear. All black and white with gold flourishes and accents. Scattered across a few desks, every representative faced her. Notably, the two people in the center of the group looked much older than the others. Wrinkled and weathered and gray.

One in a white suit, the other in black—one feminine, one masculine. The femme representative in the white suit had intricate, geometric, golden strips along their face and neck. The masculine representative in the black suit had strange dark gray ovals that entirely covered their eyes. These ovals seemed physically embedded in their

eye socket to Chaeyoung. Those lidless dark gray pools pointed in her direction, and she sensed something staring back at her from the shadows.

Chaeyoung cleared her throat and began.

“Thanks for the introduction, Dr. Qureyshi.”

She then turned and looked behind her at the projected images to make sure they were correct, then smiled at her audience.

“We live in an incredible age. Seven billion people have never set foot on Earth in their lives and every single one of us in that number depends on biological support from thin, synthetically constructed, ecosystems—mere approximations of the depth of complexity that exists on Earth.”

Chaeyoung’s slides shifted autonomously as she spoke certain keywords pre-programmed into her talk. Initially, the slides showed the Sun, then they shifted into the impressively large Elysium Lake on Mars, the bubble farmlands of Titan, the public parks on Callisto’s ring habs, a quick collage of Wolf’s megacity seascapes, Jin’s moon-habs on Vas and Skarda, and finally the mega *celariums* near the Vermilion Cape in Tiantang on Celosia. Each represented immense human ingenuity. Each is a complex system critically important to life outside Earth’s biosphere.

“Many say this is an age of xenobiology, with exobiology, the search for life that cannot trace its evolutionary origins to Earth, left to

scientific navel gazing,” Chaeyoung took a deep breath, held it, then let it out. “We even use the air we breathe here on Celosia as evidence for this, as an explanation for why we find nothing living out here, only fossils, ourselves, and the things we have created. Dr. Qureyshi and I both believe the study of the evolution and origins of life should look outward again.”

The audience member in the black suit leaned forward. “Are you referring to the Oxygen Hypothesis explored in your Great Filter paper?” they asked in a thick, unplaceable accent. “Your paper about Early Ahtash evolutionary models?”

Images of the fossilized microbes of Mars, the fossil beds of Ahtash, and the nearly self-replicating protein strands—which were technically non-living structures—of Europa appeared on the screen automatically. Chaeyoung paused the slides with a frown, as she felt misunderstood. She collected her thoughts, paused, and picked her words carefully.

“I don’t think we actually mention the Great Filter once in that paper,” she said. “But yes. Our conclusion was that finding fossils on Ahtash is deeply shocking if we also believe the Milky Way is mostly lifeless.”

“You don’t believe the theory that abiotic oxygen production around most stars, particularly M-dwarves, acts as a sterilizing force in the universe?” the audience member in the white suit asked. They had a

similar accent to their colleague, though their voice was higher pitched and soothing.

"There's no denying abiotic mechanisms produced the bulk of the very oxygen we are breathing right now. What I am denying is it is a universal sterilizing force. We found fossils on Ahtash, which is an extrasolar capture, so we know multi-cellular life can still evolve. Oxygen reduces the odds of this happening for most planets but doesn't eliminate the possibility."

"And so, we must resurrect the idea of the Great Filter?" white suit pressed.

Chaeyoung's hand shook with frustration, but she kept her cool under the pressure.

"If evolution progresses through steps from self-replicating molecules to our current state, where we build ERR-AL drives and expand, and the vanishing probabilities at each step explain the absence of significant evidence of intelligent life, discovering fossilized non-terrestrial life should prompt us to reassess the likelihood of oxygen being a universal sterilizer. That's the argument. Because Ahtashian life existed, we need to re-open the debate and explore the idea of the Great Filter."

"So, you are arguing we need to know where Ahtash actually came from, and study that system?" black suit asked.

"Precisely. But more than that, there is some urgency, as if the Oxygen Hypothesis isn't as strong as we thought, then the Great Filter could be ahead of us, not behind us."

White suit frowned. "What would it mean if it was a step ahead of us?"

"That there's some choice, some biological force, or some external force that threatens humanity with omnicidal total extinction in our future."

Black suit stroked their chin. "How far in the future?"

"Maybe tomorrow, maybe in a million years."

White suit nodded. "What systems would you check, Dr. No, for the origin of Ahtash? Assume resources did not constrain you?"

"Well, from my own simulations...I would check Mu Herculis."

"And you think this project is urgent and a higher priority than, say, extending the human lifespan, preventing interstellar war, or the various social, political, and economic issues that still plague us?" white suit asked. "Why not explore uninhabited systems in all directions? Put resources into exploration again. After all, we have not explored every planetoid and ocean in inhabited space."

"Ahtash came from another star system. That is a certainty, not a chance. Plus, it would involve putting resources into exploration again, but in a focused way."

"What if the Great Filter is external?" black suit asked with a raised eyebrow.

"As in, beyond the human?"

"Yes. What if ERR-AL capable life is rare, but not because of microbiology or oxygen or some natural evolutionary process, but because there is some galactic policy choice we don't understand? Maybe the lack of signs of non-human technology is because leaving signs is dangerous, and the only species that make it are those that can hide?"

"Why search at all, then?" white suit asked their counterpart.

"Wouldn't it be like sweeping with active radar? We discover why it's dangerous, but also reveal ourselves to that danger."

"If we live as if there's nothing looking for us, we could just as easily reveal ourselves, and have no warning," Chaeyoung said. "Instead, if we search in a targeted and small-scale way, we might learn that some of these fears are unreasonable. We might find they were conjecture and speculation that would only fit inside the space of our ignorance. And if we can shrink that space, even a little, there's a lot less hiding room for fear, paranoia, and danger."

There were murmurs as all six of Chaeyoung's audience spoke quietly among themselves. Whenever the conversation was loud enough for her to catch a word or two, it was in a language her EAR did not translate, and she did not even recognize.

She shifted her weight nervously between her feet and picked at the vent grill on her computer unit as she waited. She was sweating, and she was giddy. Almost in her element. Everyone at Beebs had made her, and Sania too, feel like fringe researchers, fueled by concentrated hubris—but as she looked at the audience, they seemed interested, and serious.

Black suit put a hand up, and the discussion stopped abruptly. “Dr. No, do you have any idea why we’re interested in your ideas?”

For a moment, there was an impulse for her to say the first thing she thought, but everyone in the room looked at her as if they were holding their breath, hoping, or fearing, she would say the right thing. She tilted her head and considered the question. Acheron Private Capital Group was, primarily, a defense contractor to the Cooperative Aerospace Defense Services of the Spanning Worlds, known more commonly as CADSS or Cooperative Defense. She was doubtful they were interested in her research for a purely altruistic reason of defending all humanity, but perhaps they saw it as an opportunity.

“If you think I might be right, then it’s important for a defense company to be aware of, however,” Chaeyoung tapped her fingernail against the scar across her cheek. She paused, considering her next words. “Neither the public nor regulatory bodies are very interested in exploration in uninhabited space and doing it under the guise of exobiology research might be enough to get a foothold in some new

systems before there's broader interest. Get the lion's share of claims registered on IBIS before anyone knows there's anything worth claiming."

"Ah, Dr. No," black suit chuckled. "Nothing so cloak-and-dagger as that, but you're skeptical. I like that," black suit said with a nod at white suit, who returned the gesture. "Dr. No. Excellent presentation—and argument. I will send you our proposal shortly, but the bottom line is we want to outfit a multiple year expedition looking for exobiological signatures in uninhabited systems. We can easily adapt one of our spacecraft for the expedition, under your advisement, of course. Our initial plan is to begin with Mu Herculis as you suggested and... I believe argued in your paper with Dr. Qureyshi...this is still the best candidate for Ahtash's origins?"

Sania excitedly nodded and smiled at Chaeyoung.

"Uh, yes," Chaeyoung nodded. "Yes, Mu Herculis is the best candidate for the origin of Ahtash."

"Good. You understand with the distances involved, we cannot rely on autonomous systems alone? Time lags are too large, and the environments are too uncertain. It's easier to have an in-system base of operations supervising autonomous probes directly."

"Of course, that is standard practice in inhabited systems, too," Chaeyoung said.

Black suit tilted their head in acknowledgement. "Good. We would like to train, outfit, and fund you and your chosen scientific crew to oversee this expedition to Mu Herculis using our spacecraft, SSV Jiuhe."

"How long do you expect this expedition to take?" Sania asked, bluntly.

"We would fund the expedition for upwards of ten years, in tau time, fifteen in proper time. We expect an initial excursion of three Solar years, proper time."

"When?" Chaeyoung asked as her stomach lurched, though what she had wanted to ask most was, why?

"I believe your postdoctoral appointment renews soon?"

Chaeyoung nodded. "Yes."

"Ideally, we'd begin the planning stages as soon as you seal the contract. Training with the crew as soon as your postdoc contract lapses. Reach Vega no later than 68150, Sol universal, then on to Mu Herculis within twenty days."

Chaeyoung's blood left her face, and she saw Sania expectantly turn to her for an answer, but her skin had gone cold. Warmth was spreading up into her throat.

"Erm, ye...yes! Yes, absolutely. I will lead your expedition. I will seal the contract. Excuse me, sorry."

Chaeyoung burst out of the conference room into the hallway,
and almost made it to a waste unit before she vomited everywhere.

Chapter Four

[68839] Frederik

Skarda

Frederik watched curiously as a gull picked at the stringy white pseudo-flesh of an autonomous crab. Smashed open upon a blue-white sandstone rock face, pieces of its chitinous shell fell in little white chips onto the kelp-covered shoals below. A few body lengths above the gull and its prey, Frederik leaned his elbows against the stone guard rail and peered down. As if in a starving frenzy, the gull picked at the artificial decapod's corpse, but there was no nutrition or sustenance from the auto's pseudo-flesh.

A cool, salty breeze wafted over the open waters of Lapis Lake. Frederik clasped his hands tightly and turned his attention away from the gull. As he closed his eyes, he imagined he was on the endless shores of Celosia—Ya Ke's only habitable planet—instead of beneath the dome at the top level of Arco Lazuli. He could believe he was under a natural atmosphere, beneath the starry sky filled with twinkling stars.

A gentle song played, carried by the breeze, announcing the imminent transition between the night and day cycles. Frederik tilted his head up, opened his eyes, and smiled. His heart ached at the beauty of

this moment as the yellow-white starlight from Ya Ke crested over the horizon—a moment of natural warmth. Bathed in the stellar irradiance, his heart filled with joy. He took a deep breath, held onto that feeling, and sighed contentedly.

Arco Lazuli was the largest of many sprawling mega *celarium* complexes drilled into the surface of Skarda, the fourth moon of the gas giant Jin. The tidal locking of Skarda around Jin produced long days of overwhelming starlight and long, frozen nights. Carved deep into the blue Skarda marbles, Arco Lazuli was safe from the extreme temperatures, along with the expected perils of space.

At this top level of Arco Lazuli, where Lake Lapis was, the *celarium* had a high dome surface over ten stories from the ground. Artificial lights covered the domed surface, simulating natural, standard luminosity, daylight—not the overwhelming starlight from Ya Ke at Jin’s orbital distance, but something dimmer, like the more distant Celosia experienced.

Between these lights were the etchings of a fine geometric tiling in a Martian-style trellis. With some regularity, certain panels in the geometric pattern were large spinel ceramic windows—a glassy, transparent material as hard as most metals. The spinel ceramic windows allowed some light through, but in the brutal Skardan daylight there was a single moment—at the balance point between long Skardan day and long Skardan night—where the light was completely unfiltered

by the obsidian black protective polarizers.

It was not through luck that Frederik caught this moment, but choice. Whenever his schedule allowed, he took the time to be here, on Arco Lazuli, to catch the glimmer of true starlight from Ya Ke, the eponymous star of the system.

Frederik's attention drifted away as the fleeting moment ended, and he looked back down to the gull right as it called out, then flew away. Frederik tracked its flight to a distant bluff overlooking the lake, noticed it had long strings of wires dangling from its beak, and watched as it dove into a nook.

He wondered if the bird was not desperate for food at all. It would not find any sustenance in the artificial attendants that maintained Arco Lazuli. Instead, it seemed likely it had found a clever use of the metallic innards to construct a nest. Frederik looked back down at the innards of the eviscerated crab body left on the rock below. He watched curiously as fellow autonomous crabs pulled the last of the pieces away and crawled back to their hiding places among the gyrus-like rock faces.

He took a deep breath and looked over the wide lake, wondering what he would do with the rest of his day. A mixture of natural birds and flight-capable autos filled the air above the gentle waters, while human activity and infrastructure turned the water into a marvel surrounded by public parks. Partially inspired by The Lattice, the

mesh of wires and aquaculture on Celosia, Lapis Lake's center, was a hive of habs, algaculture, pisciculture, and more.

This was all part of the philosophy of Martian pseudo-planning. Procedurally generated microbiomes and physical space, designed to allow life to flourish in a barely controlled chaos, managed through the oversight of thousands of decentralized systems with redundancy and plenty of slack. Even the designers of Arco Lazuli did not know all that lay beneath the waves and soil of the *celarium*.

A controlled unpredictability acting as the boundary conditions for a thin, though complex, ecosystem constrained to exist within a defined superstructure, where the outermost wall of the *celarium* was the only ultimate constraint. The mixture of biological and artificial autonomous systems gave Arco Lazuli a vibrance and life to it, even when there were no people, like Frederik, around to see it.

In a few hours, people would stream out of the cramped confines of the largest Skardan cosmodrome, which was connected to Arco Lazuli, and visit the mega *celarium*. These guests and visitors would easily double the population in the megastructure. Soon, it would get quite crowded.

There was a tickle on his left wrist from his seal bracelet, and he ignored it until it became a steady buzz of haptic feedback. Reluctantly, he tapped on the dark gray surface of the bracelet. Text appeared to be anchored on the surface of the bracelet. As he moved

his wrist, the text on the seal bracelet followed.

Illusory text posed a question:

[Activate Extraocular Augmented Reality system?]

His fingertips tingled as he pushed his hand through the text and waved to reactivate the rest of his EAR system. There was a gentle glow in his peripheral vision as implants on his optic nerves gently formed the illusion of his personal EAR interface. In the default heads-up-display mode, he was able to effortlessly find information like the local time, his rough location in Arco Lazuli, what part of the local work cycles were active, and the ambient temperature in his section of the *celarium*.

An icon of a radio dish jumped for attention near the left edge of his field of view. Each hop coincided with a buzz on his wrist. He pinched this eager icon with his left hand and pulled it open in front of his nose.

A translucent frame covered his view of the lake of Arco Lazuli, then filled with logograms, symbols, and colored triangles. The arrangement of these shapes secured and encrypted information. It was a seal code waiting to be unsealed by the biometrically locked quantum encryption key stored on his wrist.

Each of the corners of the seal code contained an *Arte myawn* logogram embedded in a small red maze, guiding the unsealing algorithm by defining a seal code's border and providing a mnemonic

check for the final output when the intended recipient got the seal—
though hardly anyone asked for a mnemonic verification anymore.

For now, he kept the rectangular seal snugly stored in his
bracelet, so he pressed its edges. There was a gentle prick at his wrist
from the blood sampling and then watched as decrypted headers
emerged from the dissolving seal code.

[Seal Status]

Good

[Signer] [1]

"Betty Blue" [349-11-0101-011-407715]

[Co-Signer][2]

"Absolute Horizons" [345-00-0001-000007635958558]

"Domot Get Grond Dey (Han Oblast)" [263-02-0299-
000000006405194]

[Signed] [1]

68839-22:59 CelosiaLT

[Verified][3]

68839-23:00 CelosiaLT

68839-23:20 CelosiaLT

68839-23:29 CelosiaLT

An autonomous contract, authorized for negotiations.
Unusually formal, Frederik thought, and looked skeptically at the sender.
No name, only the seal hash and a pseudonym. Absolute Horizons. He

recognized the corporate entity making the request.

Frederik hesitated. As a bonded and sealed member of the *Domot Get Grond Dey* cluster, he could simply ignore the message and let someone else deal with it, but someone—or some autonomous system—in *Domot Get Grond Dey* had already accepted the terms offered by Absolute Horizons and co-signed the contract. So, someone from the *arroyo*—the network of resource transporters that spread throughout Ya Ke like roots of a tree—would have to complete the contract or risk the quality of the cluster's status on IBIS for future work.

It was terrible timing. He had just settled his daughter, Diya, back into a stable life on Skarda, and he had planned on at least twenty more days before they had to take their next job. But it would either be him on this job, or someone else he probably knew. He grimaced at the thought, but he knew that the faster he completed jobs, the faster he would get a permanent home for Diya. A little more pain now, for a lot less pain later.

He opened the contract, then activated the provided autonomous negotiator.

It was a generic Absolute Horizons generated portrait of someone who would be nondescript in Frederik's local environment, but did not seem memorable enough to be anyone he had seen recently. The avatar bowed their head politely and spoke a dual-gender, stereo voice typical of a United Planets autonomous personality. Frederik

found the effect of two different voices speaking in unison quite strange, but the Uppers sure seemed fond of the choice. As the auto spoke, Frederik's EAR translated and transcribed any words unique to the United Planets trade language—Upblanda—beneath the auto's portrait.

"Awnyawnggha shimka to our esteemed partners in the Spanning Worlds Independence. In this contract document you will find—"

"Please show me the contract summary."

As the avatar bowed their head, a new window appeared with an orbital map of Jin. A simple spherical region extended around the gas giant, just past the orbit of the third moon of Vas, representing the exclusion zone. Skarda was close to the zone, but never inside, while Vas was at the edge, but its orbit would occasionally, but regularly, bring it inside the exclusion zone.

Every star and every planet had a similar exclusion zone, or EZ, though it scaled with mass and was irrelevant around a smaller moon like Skarda. Neither politics nor regulation defined this zone. Rather, the limits of physics and engineering inherent in the ubiquitous ERR-AL drive—the *gidizip* in *Di Lingua*—defined it.

Powerful linear accelerators built along the spines of some spacecraft produced exotic matter in nested bubbles of warped spacetime to enable superluminal travel. Within the exclusion zones,

gravitational forces disrupted this delicate warp of spacetime. At the limits of precision of manufacturing, operating, and calculating trajectories for an ERR-AL drive, these exclusion zones were more-or-less fixed based on known empirical formulas. A fortunate reality for Frederik, as there was a need for a purely Newtonian spacecraft, like SSV Ergo Infinitum.

Of course, every Solar year, some *meesee ill binu* from Celosia—and they were almost always from Celosia—would declare they had defeated the limits of engineering precision and broken past the limits of the exclusion zone. Each attempt yielded nothing but another rescue mission to save the poorly constructed prototypes stranded deep in the well of Jin without enough rocket propellant, or supplies, to make it back out of the EZ alive.

The auto highlighted Skarda, the fourth moon of Jin, disrupting Frederik's thoughts.

"In accordance with local orbital regulations, SSV Ergo Infinitum, operating on behalf of *Domot Get Grond Dey (Han Oblast)*, will rendezvous with an Absolute Horizons low orbital station in the Ya Ke star system, serial number Juliette Sierra zero-two—"

"Skip to the final contract summary, please."

"Passenger transport for five guests. Less than one ton of cargo. Three stops: Near Skardan Orbit to onboard passengers, a recycling repository at the edge of the Jin exclusion zone to pick up a

single cargo container, and finally completing the delivery contract at SSV Fengshen in a high polar Jin orbit. If agreed upon, an Absolute Horizons representative currently on Skarda will accompany SSV Ergo Infinitum crew from the surface to Near Skardan Orbit and the rest of the passengers will join at the orbital rendezvous."

On his EAR, the orbital map updated as the auto spoke. Frederik was familiar with SSV Fengshen. It was a spacecraft-turned-station in a polar orbit around Jin, almost perpendicular to the orbital plane of Skarda, Vas, and the other moons of Jin. It was an independent space weather monitor for the Jin orbital jurisdiction. Frederik scanned the range of dates for the contract and the proposed compensation.

He frowned. "Are these contract completion dates correct?"

"Of course, *ohlowyeh*."

"These are tight timings. We'll have to burn a lot more delta-vee than usual to make it on time, and it's going to mean we can't take up our regular restocking contract with SSV Fengshen in nearly three weeks."

"Of course, *ohlowyeh*," the avatar seemed frozen in place.

Frederik frowned. "I am worried it will reduce the IBIS reputation of my crew if we—"

"Negotiation terms accepted, *ohlowyeh*!"

"Terms?" there was a small jolt of anxiety, and he wondered if he had made a mistake. "What terms do you mean?"

"Under the current proposed contract, and pursuant to timely delivery of passengers to SSV Fengshen, the conflicted future contract to restock Fengshen will be sealed as satisfied—including appropriate payment."

"Hmm," Frederik scratched at his beard. "Are you saying we will get paid as if we restocked Fengshen, in addition to the payment for this current job proposal?"

"Yes, *ohlowyeh*."

"So, is that double the usual 5,000 Tonn amount to *Domot Get Grond Dey*, or do you mean double our crew fee?"

"Regular crew and organizational fees will be paid upfront, *ohlowyeh*, while the remaining payment will be sealed upon arrival at SSV Fengshen, for a total amount shown on your EAR."

[279,287.97 S₩ [247,227.71 ₮]]

"*Nawa oh!*"²⁵ he gasped.

Nearly two hundred and eighty thousand *swawn*. Triple the usual restock and resupply contract, with all the costs paid upfront. And even with a fast burn and tripling the crew's share, it would not triple the costs of a haul. In the end, it amounted to an almost tenfold increase in the share Ergo set aside for the expansions to the *Domot Get Grond Dey*—a year's worth of set-aside for Frederik and Diya's permanent

²⁵ [*Di Lingua*]: Woah!

home. And if Frederik gave up most of his share to the cause, it would amount to nearly fourteen months' worth of accumulation toward that goal in a single job. They'd have a permanent home this year, not next.

"Is that correct?" he frowned at the concessions the auto was able to make. "That's quite a large payout to get a few passengers to a weather station, isn't it?"

"I'm sorry, *ohlowyeh*, I do not understand the question."

Fredrik laughed nervously. "Hah...when do we have to make a final decision?"

"You have until 68840-07:00 SolUT to seal and respond to initial signing and co-signing parties," the auto answered.

Fredrik nodded. "Oke. You are aware of Ergo's sealing procedure, ye?"

"Of course, *ohlowyeh*."

Fredrik pressed the button on his seal bracelet, placing his sealed co-sign on the contract. "Oke, forward my sealed contract to the others on the crew manifest."

With a deep polite bow, including the formal hand laid flatly over their stomach, the auto acknowledged his seal. "Of course, *ohlowyeh*. We look forward to a quick sealing, and as always, thank you for choosing Absolute Horizons!"

Fredrik cleared his EAR with a wave, and let his thoughts idle in the growing murmurs of the day-shift crowds swelling around him in

Arco Lazuli. He took a deep breath, feeling the air entering his nose and tickling the hairs of his well-groomed beard. He hoped to regain the calm he had in that moment of Ya Ke's starrise.

Eyes closed, he failed. There was something resting over his shoulder. Pressure from a stranger leaning against him.

He opened his eyes, irritated, and saw the former sole of empty boot, carved out and removed with a *cut* knife, dangling by laces wrapped around fingers with short, but elaborately painted, fingernails.

This empty boot sole was bent into an uncomfortable and unnatural shape, replete with a series of barely effective straps and unwieldy cylinders attached underneath where the heel would go, if it was still the sole of a boot and not some jury-rigged fashion item. A spacer's high heel.

Frederik was about to shout out in anger at whoever had trespassed into his personal space when he caught a familiar scent.

"Cutting our leave short by twenty days, old man?" a familiar voice quipped with the singsong of a Chironian accent and a click of the tongue.

Frederik let out half a sigh before he rolled his eyes. "You could always refuse to seal the contract, lo."

He pivoted under lo's arm to face her, but moved so her shoe stayed over his shoulder. lo was barefoot and in basically nothing but her *pata* with a purple and green jacket tucked under her armpit. Despite

being covered in a thick layer of glitter, sweat, dust, and night-life detritus, her tattoos were still plainly visible.

Io's tattoos covered most of her back, both of her shoulders, her right thigh, and her left forearm. Many of Io's tattoos were *Arte myawn* or in an Earther style, but a few refused to conform to this trend. Her left forearm tattoo mimicked the traditional monochromatic and heavily geometric Martian style, but her right shoulder was a Chironian tattoo made with older *Arte steh* methods that used a kind of pneumatic needle gun. Located right above the knob of her shoulder blade, this intricate Chironian tattoo's colors ranged from dark black to an unsaturated cobalt, and the few pockets of negative space contained colorful portraits of the worlds Io had visited.

Io's smile was infectious. His frown and skepticism melted before her. Whenever they shared calm moments like this, he sometimes felt like he did not need a fixed location, so long as his daughter and Io were there. Frederik considered that feeling—that gravitational pull Io still had on his heart—while looking at his own forearms. Her tattoos reflected her essence and Frederik's reflected his own.

Underneath the rolled sleeve of his tunic, Frederik had extensive *Grond steh* tattoos. Although each *Grond steh* tattoo was unique to the person wearing them, they were always geometric and predominantly monochromatic, and Frederick's looked like a tiling of

triangles that formed a dissolving gradient. Near his wrist geometry of his ink was a mere outline, suggestive of volume and form in a triangular lattice. Moving up his arm, the lattice filled out, iteratively and continuously, a slow inversion, creating a negative space triangular grid around solid color. From beneath his cool sable skin, the geometric shapes of this ink were the color of the red rock faces of Elysium Planitia on a stormy day.

Superficially, there were commonalities between Io and Frederik's ink work, though Frederik had more extensive tattooing, yet there was an extra layer of meaning in his own ink. He was a descendent of *Grond myawn*. He was born and raised in Skarda's Martian-like gravity, a moon inhabited and built and designed by Martians who had left Sol behind. These lines in his arm were his cultural heritage, not simple decoration, or self-expression.

Skarda was a *Neuvo Mars*, a planet with thin or no atmosphere and Mars-like gravity, making it perfect for *Grond steh*. Unlike the *stellah steh* who had assimilated to near-standard gravities, those who came to live on *Neuvo Marses* designed all their habitats to work at Mars-standard gravity, not Earth-standard. Like any upstanding community member of the *Domot Get Grond Dey*, his body needed to thrive in higher acceleration than he had been born into, and so his body contained extensive musculoskeletal implants and enhancements.

To him, his tattoos stood for the hard-won legacy of

generations of Mars's descendants pushing forward, one hab at a time, to make the universe livable for future generations. While Io's seemed to reflect a preference for chaos and novelty. Hers were highly individualistic, and mercurial, like her own heart.

He was working to secure a stable future in *Domot Get Grond Dey*, and she was working as the end-to-itself. She was a nomad, and he was a farmer. That was why he had pulled away from her. Pulled back from what they could have been together.

Io gently touched Frederik's forearm, bringing his attention back to her, away from his sullen musings. She shifted her weight and smiled slyly as she tussled her warm, light-red-blond shoulder-length hair.

"I suppose I could cash out from Ergo and catch a ride to Celosia instead," she said.

Sometimes, it was like Io had read his mood and thoughts as though they had popped up on her EAR. However, sometimes he also had a deep understanding of her inner life. He glimpsed a flickering frown at the corner of her mouth. He turned, leaning his back and elbows against the railing, and faced her. They were both saddened by the thought of Io leaving Ergo Infinitum, for good, though Io would only admit that under duress.

"You'd get bored on Celosia within a month."

"Oh, yeah?" Io gave him a performative frown that did not touch

her gray eyes. "You don't think I could get up to trouble in the sprawling metropolis of Tiantang, *Eff*? I am the wild spirit of my home planet Chiron set free in the Spanning Worlds!"

"Exactly, Io. You would burn hot, but fast. You might even get bored with life on Celosia in just a week."

"What is the alternative?"

"You're already part of my *arroyo*, Io. You have been ever since you came to work on Ergo," he pressed.

Io laughed. "Ye ye, I know I know."

"Ye, and you also know with all those years of work you helped us gather the resources we will wind up using to build the superstructure for the *sa-sheb deul* hive."

"Really? You think space farmers will keep me interested longer than Celosia?"

Frederik shrugged his hands, wanted to say so many things, but let the opportunity slide past.

Io took a step closer to him and balanced herself with one hand on his shoulder as she put the heeled boots back on. Frederik had to flex to keep them both balanced. Io made a gentle push motion aimed at each of her heels with her fingertips, and they responded by cinching and conforming to the shape of her foot. Fabric pulled itself up well past her knee, half-way up her thigh, as it stretched. Fredrick assumed there was some EAR interface.

"Neat, *eh?*" Io asked as she changed the subject. "Just hacked the haptic feedback—sends a slight electrostatic charge and activates the piezoelectrics. It's like a biosuit with the counter-pressure straps, or gecko grip," she wiggled her fingers like insects in front of his face.

"Doesn't cover much."

"Ye, but when you wear these, you wear it to look *kacha bul*. It's not supposed to be a practical outfit."

He had a hearty laugh and shook his head. "I don't know about all that, Io—looks like some *juan juyey hey well steh tsow olodo dey*."²⁶

She smiled as she rolled her eyes. "Ye ye. Looking like some *wonda mo* fresh from Celosia with no sense of space looking for something you can only find down here in Jin's gravity well is the point, old man."

He raised his eyebrow skeptically. "But can you walk in them?"

"*Byanjeng bin dey!*"²⁷ There is gecko grip on the bottom."

"Is that the default, or another Io modification?"

She held her hands up, again mimicking a saintly pose with her gaze up to the top of Arco Lazuli's dome. "Ah! What do you think? I am a master of adaptation," Io yawned. "Let's get back to the hab—and tell me about this new contract. Why should I seal it and not cash out?"

"*Oke. Comot.*"

²⁶ [*Di Lingua*]: Loudmouth, planet born, horny fucker.

²⁷ [*Di Lingua*]: Of course!

Io grabbed Frederik's arm, pulled herself close, and the pair walked through the gardens to the outer edge of the massive dome on the top level of Arco Lazuli.

"They've offered a generous contract for shuttling some weather station crew to Fengshen."

"Hmm, two hundred and eighty k-swawn to shuttle a few folks to a weather station?"

"Ye."

"Over generous, hmm," she looked up at the Arco Lazuli dome as they walked toward the edge of the *celarium*. "What are you thinking?"

Frederik shook his head. "*A gah mot sabi.*"²⁸

"A bit strange, ye?"

"To say the least. Upfront pay is enough to cover the entire trip, but Absolute Horizons throws around a lot of resources for inscrutable reasons," he said. "I don't think there's a lot of risk. Why not seal it and do the job?"

"Eff!"

Io tugged at his arm. He couldn't help but chuckle—even with the added height from her strange shoes she was a quarter of a meter shorter than him. He smiled down at her.

²⁸ [*Di Lingua*]: I don't know.

"*Wetin dey?*"²⁹

"You really think this is a low-risk job? At triple pay?"

"*Domot Get Grond Dey* already sealed," he said. "Almost no cargo on the way out. Already got them to agree for increased pay because of the time constraints, but the orbital timing is on our side so we can use a lot less propellant, we might even manage a propellant shuffle from Fengshen to Horizon's Edge and increase our final payout by another forty thousand *swawn*. It's a good enough deal that *Domot Get Grond Dey* might even look to hire replacement crew for anyone who refuses to seal from Ergo—three hundred Tonn per day for a freelancer is easily worth it—so might as well be me and you and Ergo, ye?"

Io shrugged. "*Oiya!*"³⁰ People who aren't from your damned hives don't pay people extra unless there's some serious risk, *Eff.*"

"They do if they're in a hurry. Maybe they're just on a time crunch?"

"A time crunch to get where? To get to a weather station? Why? Perhaps if it was a secret dance club, I would understand," she flashed him a crooked smile before she got serious again. "But even if they're in some rush to see a wildly exciting once-in-a-lifetime scientific event—that we've never heard of and didn't hit the streams yet—who has the interest and the resources to afford that?"

²⁹ [*Di Lingua*]: What?

³⁰ [*Spanning Words*]: Yikes!

"Fine, *oke*. It doesn't make a lot of sense. You're the smart one—what do you think?"

Her smile was gone. "Spy shit," she said.

"*Prastitey?*"³¹ he nervously laughed. "What do you think is going on?"

Io nodded and let go of his arm. "There are a lot of Cooperative Defense facilities on low orbit over Jin, right?"

"*Shey, ye.*"³² Cooperative Defense—CADSS—has a lot of defense systems in Jin's exclusion zone, why?"

"*Oke*, well...it's a weather station? They've hauled cargo with us, and the passengers are a rounding error in the cost when they do that, but we rarely haul over more than one or two of them—"

"Ye, so what?"

"—maybe three—so, what? We're always hauling at least fifty tons of supplies, and usually closer to one hundred to make it worth the propellant cost. Well, *Eff*, they're offering us triple that usual rate to get a few scientists there but not having us lug any cargo? They're spying on the CADSS."

"We've restocked Fengshen a few times now...was it always a spy outpost? Think we'd have noticed after all these years. Also, if they're spying why wouldn't they bring more equipment?"

³¹ [*Di Lingua*]: Excuse me?

³² [*Di Lingua*]: Right, yeah.

"I dunno, but we never exactly got a tour of their facilities, have we? Ever take a close look at any of their equipment or the crew? Who's to say your friends in *Han Oblast* didn't know it was a spy outpost when they sent us that first resupply job years ago?"

Frederik angrily shook his head. "Our *arroyos* don't work with militaries. Out of all the *oblasts* in *Domot Get Grond Dey*, *Han Oblast* is the least likely to break that rule. And no one from *Han Oblast* would lie to the crew about a job. That's an unforgivable line to cross. The *arroyo* would dry up real fast if word ever got out."

"Maybe they just look the other way—a lot of people do that when they have a lot to gain. Hell, in my experience most people refuse to see the plain truth if they have anything at all to gain and the only thing needed from them is ignore what they can plainly see," Io poked Frederik's shoulder. "With as much *swawn* they are offering, the *Obialos* are years closer to having your own hive, right? You know, that one you keep hoping I will live in?"

Frederik raised an eyebrow. "Ye, this job would accelerate the plans for the next hive, but that doesn't shift my judgement when it comes to risks of the job."

She sighed. "I dunno, *Eff*...maybe they want to launch some corporate espionage op when there's bad space weather? Fengshen is deep enough into the EZ, and close to the low orbit stations that skim Jin's clouds...they can probably get a team to one of the military

stations and back out if a coronal ejection ever got dicey enough. Or maybe they're not Upper spies at all...might be some internal Cooperative Defense intrigue."

Frederik laughed. "*Juan juyey!*³³ So factions within factions and constant power struggles?"

She nodded. "Ye, why not?"

"The Spanning Worlds doesn't have intrigue like that."

"You did once," she said with a nod to the colors of her jacket.

"We all did, at least once."

"The war was a long time ago, lo."

"Hostilities don't die that easily, and it wasn't even that long ago," she shook her head. "We're getting off target here. The risks aren't just getting wrapped up in some questionable run, *Eff*, the risks here are what they're asking us to do is going to get us killed or wrapped up in some military or corpo shit. Absolute Horizons is an Earther corp. They've been fine to us so long as all we did was bring them *doshiraks* and fresh gear, but whatever is really going on Fengshen is not just monitoring proton flux or whatever the fuck a space weather station does."

"How? How do we know that? *Arte steh* are just strange people, lo. Maybe they really are just monitoring space weather because it

³³ [*Di Lingua*]: Bullshit.

impacts the price of helium. You know how they're always desperate for any little extra slice of information to feed into their large autonomous models so they can predict what will happen here despite the *gidizip* time-lag. Anything to gain that extra fraction of a percent better information to win their wagers. Plus, they can leave Earth, but they can never return. Banished by their own people to live out here with the *stellah steh* and *well steh* and *grond steh* and—"

"I know SSV Fengshen isn't what it pretends to be because of the price they're willing to pay for the contract, *Eff*. Please, trust me on this," she said with a pleading look up at him. "I grew up around this kind of nonsense."

"I appreciate the concern, lo," Frederik said. "But you know I already sealed the contract, and you know how much Diya needs this. How much I need this? I just want a stable place for us before she gets too old and—"

A notification appeared on Frederik's EAR. An update to the contract. Someone from Ergo's crew had sealed and signed.

[New][Co-Signer][3] "Juhasz, lo Park" [340-13-0109-011-907348]

"lo...you sealed it?" he asked, bewildered. "Thank you."

"I will not let your naivete and pacifism get you killed."

"Hmm, I take my thanks back."

"Ha! Too late! I'll be there the whole time to keep an EAR spun

up on our guests—and watch your backside, too,” she said with a wink and a smile that did not touch her sad, watery eyes.

“Great,” Frederik groaned. “Don’t cause too much trouble, oke? We’re not even amateur spy hunters.”

She laughed, and then patted his chest as she yawned. “Ahh! Of course not. Now, *comot*, let’s get back to the hab—I need to crash before we lift-off.”

“You think the others will seal the contract?”

“They’d follow us to Tartarus if we went first, *Eff*,” Io hummed to herself.

Chapter Five

[68419] Chaeyoung

Mu Herculis

Chaeyoung and Vis were walking along the grow racks on the aft-most spin deck of the Acheron Private Capital Group spacecraft, SSV Jiuhe. These grow racks, algae tanks, and herb gardens were on the topmost deck that was furthest from their sleeping quarters and the conference space, which made it, strangely, further away from “the outside” of space. Instead, they were nestled at the top of the spin deck, closer to the superconducting rings that kept the spin habs rotating, but also closest to the elevators that could take people to the storm cellars that were nestled around the ERR–AL drive, or to the microgravity command decks and cargo bays.

Besides the small matter of spatial confusion from living in a spin deck, Chaeyoung had never been happier. They were achieving her dream. They were really in Mu Herculis for scientific study. Better than that, she had cajoled Acheron into hiring Vis, though ultimately Vis’s agronomy certification was more compelling than any argument.

It was a good judgement call, and not just for Chaeyoung’s own self-interests. Vis had tended the extensive green spaces of Jiuhe

wonderfully, and it had been an enormous morale boost for all the crew over the last one-hundred days in Mu Herculis.

Walking the area with Vis always lifted Chaeyoung's mood, fondly reminding her of the cramped military barracks on Ahtash where she had spent her earliest years as a kid with her friend Sania. More than that, it had become one of the few truly private places on Jiuhe where people could get away from their expedition colleagues to decompress.

"If I have to sit through another meaningless status meeting on the laser altimeter and the state of our scan of this orbital area," Chaeyoung groused at Vis. "I am going to scream."

Vis laughed and put a single finger up to her lips to shush her. "You know your bad vibes are going to make my little friends grow slower," Vis nodded to the surrounding plants.

She stared cut knives at Vis. "*Yu gah A il kpafuka!*"³⁴

"So dramatic," Vis laughed again.

"I don't know why Flores wants to keep surveying this gas giant. We should have left Taeyanggu behind weeks ago."

"He probably just wants to make sure everyone understands every part of the survey jobs we're going to do before we get further into the survey."

³⁴ [*Di Lingua*]: I'll ruin you!

“Maybe. I just want to sling-shot toward the main belt and get on with it.”

“So impatient. It’s only the third pass on image processing, right?”

Chaeyoung smiled at her. “Ah! So, you do listen. Jiuhe’s computers and autos are doing most of the heavy lifting so far. I really don’t think there’s a lot to learn from what we collect here, at least not without a fuller picture of the system.”

She looked up and squinted at the simulated sky peaking behind the red glow from the grow lights suspended above the tall stalks of plants on either side of their walking path.

“I think we should just flag regions of interest and move on. We can analyze them later. Return if there’s anything truly interesting.”

Vis continued to walk through the plants, dabbing each plant as they went. Carefully inspecting any leaves that looked problematic. She bent in close to poke at a particularly chlorotic leaf.

“Anything exobiologically interesting so far?”

She forced a laugh. “Ha! No.”

Vis moved her finger away from the sickly leaf to point at Chaeyoung, looked up at her with EAR mods glowing a brilliant blue.

“Admit it! You couldn’t be happier,” Vis said as she pressed her finger into Chaeyoung’s rib playfully.

Chaeyoung blushed, grabbed Vis's hand. "I admit that I feel like I am in my element."

They continued to wander through the thin halls of the green spaces. Racks of plants in metal boxes sat over clear algae tanks. Behind them were pisciculture tanks filled with various small fish. They walked along the entire pseudo-ecological space, going through one full circumference of the spin deck, and did not even see a single hint of another person along the curved horizon ahead of them.

"Oke, I have to tell you a secret," Vis said, suddenly seriously.

She pulled Chaeyoung to a stop, then looked up at her wanly.

"Wettin dey? What is it?" Chaeyoung frowned.

Scanning both horizons to her left and right, Vis leaned down to whisper in Chaeyoung's ear. "I just distilled the first batch of *nyams*."

Chaeyoung laughed. "What? When did you start?"

With a turn, Vis twisted and put her hand over Chaeyoung's mouth. "Shh! *Abeg eheen*, be quiet and follow me, otherwise I won't share."

Vis moved her hand, planted a warm and delicate kiss on her lips.

"Oke oke, I'll be quiet."

Vis pulled her by her hand into an equipment hatch hidden behind the yam grow boxes. There was just enough room for the two of them to fit, even with the large still.

"Nawa oh!" Chaeyoung gasped. "You've been very productive."

Vis smiled coyly and scooted around to the far side of the still, dipping out of view.

"Do you leave it running when you're not around?"

"Ye, but it's monitored."

Vis's hand popped above the metal sphere of the still long enough to point at the top of the room where a multi-eyed crab auto was sitting. Red light eyes blinking, claws gently tapping to the rhythm of the *drip drip* of the still's distillation process.

"Ha!" Chaeyoung chuckled. "How much of your personal payload did this take?"

She heard Vis rustling around behind the still, glasses clinking together, and a satisfying pouring sound.

"Fabricated it all here. Barely used any of the stocks Acheron brought along," Vis popped back up and held two beaker glasses filled with green liquid.

"Why is it green?"

Vis's face burst into an all-consuming, toothy smile that made Chaeyoung blush. There was a deep blue glow in the silvery body of the still from her EAR mods as she walked over to hand over a glass filled with the distilled *soja*.

"As you said, I have been busy. *Gbam!*"

Chaeyoung took the beaker politely with both hands and tapped the rim of Vis's beaker. "*Gbam!*"

They each took a sip. It was cool against her tongue, sharp like any *soja*, with a refreshing herbal flavor. Then the spicy pepper hit her throat. She coughed.

"*Fen dan! Suya.*"³⁵

Vis laughed. "Careful, *eheen.*"

"Did you infuse this with red peppers?"

Vis smiled friskily over the lip of the beaker and took another sip of *soja*. "Something like that."

"A secret, huh?" she took another sip, this time prepared for the spicy kick, then put an arm around Vis's waist and pulled their bodies together. "I guess I will have to interrogate you, *ye?*"

Chaeyoung was hungover at the next morning's daily status meeting. She leaned her face onto the cool surface of the conference room as Patel was giving an update from the night analysis session to Dr. Flores. Except for Patel's disheveled appearance in her lab coveralls, it seemed like a normal meeting. Her hair was in a messy bun, and she had darkened rings under her eyes from lack of sleep.

³⁵ [*Di Lingua*]: Bastard! Spicy.

Patel was talking over several EAR renderings of slingshot maneuvers that were open to Jiuhe around one moon of the gas giant. The expedition had voted to name the planet Taeyanggu. An animation showed the Acheron supplied spacecraft—a cone with four square radiators—as it swung past the first moon at the edge of the hazardous radiation belts.

“We continued the search for the source of the perturbations in Taeyanggu’s rings,” Patel said. “I believe we should follow this new trajectory. That way, we can use the third moon’s gravity and exploit the Oberth effect. Explore the strange patterns in the rings and move deeper into the inner star system.”

Chaeyoung stifled a yawn, half-listening. “I’m all for anything that gets us back to the plan. We need to survey the liquid-water zone. We need to get to the astrobiologically interesting regions of this quadruple star system before we have to turn around and go back home.”

“Yes, but I am proposing this new maneuver,” Patel pointed to Jiuhe’s orbital map. “We can save considerable delta-vee, receive much better imaging on the ring structure and,” Patel took a deep breath. “And cover the bulk of our scientific objectives in orbital area—”

“What is our increased radiation exposure with that maneuver?” Liam asked.

Liam Flores was here in place of Sania, which Chaeyoung tried not to resent, given his extremely qualified and interesting background. He was short, an Earther, and had dichromatic skin. His sickly and pallid shoulders and upper arms contrasted with his tanned face and forearms. He always wore a shirt that did not cover his arms, showing off many scars, some of which clearly had stories to tell, and others appeared to be an aesthetic choice of systematic scarification. He had long, entirely greyed dreads that were braided into an asymmetric spiral that wrapped around his head in a shape reminiscent of a bun. At the end of these dreads, there were metal bits attached that gave his hair the appearance of a coiled snake.

Completing his unique appearance were the glasses he always wore, which had circular, transparent lenses cut into ovals and wrapped in a wire metal frame bridge across the end of his nose with two little hooks cupping the top of his ears. Whenever he tried to read or look at something far away, he would lean back and peer through the transparent ovals and squint. He was doing this now, arms folded over his worn and banged up biosuit that was pulled down to his waist, his Ahtashian keffiyeh wrapped around one of his shoulders. It would seem intimidating, but his face always had a deeply caring look, a face with an eminently sincere kindness, like a grandparent.

"It would eat up a lot of the planned tolerance for the expedition," Patel said.

Chaeyoung stirred, sitting upright in her chair. "We've already mapped the outer moons thoroughly, correct? Does anything merit further study? It seems like we can use delta-vee and save on radiation exposure instead—skip the fly-by of the inner moons and the ring entirely."

Patel cleared her throat. "Uh, sorry, but there's also this," an additional set of images of the inner orbital structure of Taeyanggu's moon appeared on EAR. "We found some interesting things in the data at the end of our shift last night."

Chaeyoung's head throbbed as she focused on the image. There were interesting petal-like structures in the ring system where some errant object was sweeping through and perturbing the debris.

"Can you explain these ring perturbations?"

"No, doctor, that's why we've been so focused on them," Patel said nervously. "We...we think it might be a rare asteroid-mass binary object... and the gravitational interplay between the two objects would lead a sort of sloshing motion that alters the gas giant's rings in this leaf petal pattern."

Chaeyoung skimmed the data, moving between different spectral views on her EAR, and pondered the subtlety of Patel's description. How had the autonomous systems missed it? There was a quickening to her mind, her thoughts suddenly focused on the strangeness of the astronomical event. It might be an anomaly—just

another rare event in the cosmic dance of random collisions in space—yet, she had a hunch, this was something more.

“Patel, that is a remarkable find,” Liam said. “But I don’t see a reason to deviate from our slingshot trajectory. We should continue to Mu Herculis’s liquid water zone. Especially since your proposal increases our radiation exposure considerably. We have an expeditionary budget that we need to mind carefully.”

“Wait,” Chaeyoung raised a hand to grab everyone’s attention. “How did the autos miss this?”

“I don’t know,” Liam admitted, surprised.

She was determined now.

“Well, I know one edge case the system specifically ignores. Small, oblong objects with significant variation in optical properties across the surface.”

Liam raised an eyebrow and looked very suspicious of Chaeyoung. “Yes, but not every anomaly warrants a detour.”

“You’re missing the point,” she said as she gesticulated with her hands. “The autos are looking for specific sets of circumstances we expect from studying Europa and Ahtash. That means cryovolcanism, tidal forces, large water budget, some amount of radiation, or anything else familiar from Earth—but a shard from a destroyed moon or planet would have the same properties as this object. Oblong. Reflective on one side, dark coloring on the other. We should take a closer look.”

"You've been impatient to move on, up until this very nanosecond. But now I agree it is time to move on, and you want to stay?" he rebutted with clear irritation.

"I know, but these optical properties are suggestive, and so it is worth investigating."

"Suggestive of what? A destroyed moon?"

"Yes, that's probably why the autos ignored it, but it could also be single-celled growth, like algae. It could indicate panspermia."

"Possibly. Unlikely," Liam said.

She swung around and glared *cut* knives at Liam. "I think we should use one of our probes."

There was a pause. Two scientific wills clashing in silence. Liam's eyes searched Chaeyoung's face as if he was searching for any hint of doubt. She held his gaze, feeling more confident than she ever had.

"It may be an extrasolar capture, or from further out in the system," Chaeyoung said.

He folded with a shake of his dreaded hair.

"Fine. I agree. We'll take a closer look," he turned to Patel.

"Thank you for your work, Patel."

"We send a probe as soon as possible—reconvene in five, maybe six, hours?" Chaeyoung suggested.

Patel nodded, hesitated at the door, and looked at the two senior scientists.

“Acceptable. I will let the captain know we want to launch a probe,” Liam said as he stood up. “Now it’s time for me to get some breakfast.”

Patel bowed her head politely, collected herself, and left the conference room alongside Liam.

To Chaeyoung, the science deck, which acted as the core of the scientific project on Jiuhe, seemed like a dreamscape version of an amphitheater-style lecture hall. In the center of the room, there was a depressed area with large ink displays on the ceiling and wall. From this pit, she saw both entrances, elevated and tilted by the spin deck’s curvature, and around her there were large working desks with cushioned acceleration chairs, ink displays, and translucent EAR displays hovering around the chairs. Because of the curvature of the room along the spin deck, the entire room appeared distorted, resembling a heavily curved optical lens with the edges above her bent toward the center.

It had a capacity of nearly thirty, but currently only Liam and Chaeyoung were there, sitting in chairs nearest to the center, looking up at large EAR windows and ink displays showing the stream from the

Coeus science probe as it headed toward the anomaly in Taeyanggu's rings.

Falling toward the anomaly, the probe was pointed away from Taeyanggu as its fusion drive burned hard to slow it down. There was a red glow and static flicker on the stream, and it was too bright from the fusion plume to see any stars.

Chaeyoung glanced to look at the orbital map. Relative to the primary star of Mu Herculis, SSV Jiuhe had a chaotic-looking trajectory marked in a thick white line against the black background. On the map level, Taeyanggu was just a thumb sized orange ball with light white rings reminiscent of Saturn.

"Oke, main engine cut-off should start soon," Chaeyoung said to Liam. "In 5...4...3...2...1!"

The probe's stream made a sickening rotation as it spun around to face the anomaly. Taeyanggu swung into view, filling the screen. Like its namesake, the gas giant almost looked like a treasure flower with its red and orange swirling clouds streaked with light yellows and tans. From this distance, the patterns and clouds were truly stunning, chaotic, and beautiful.

More white fog plumes from reaction control, and the probe jittered and tilted again. The ice rings of Taeyanggu swung up like a large flat disk, and there, in the center, was a black, swirling gap from the strange binary anomaly in the ring system.

Chaeyoung viewed the stream with rapt attention. She deeply scrutinized the probe's stream. At its current distance, the binary object was still a blurry, distant shape that was framed by the icy rings. A large, misshapen, stippled white and gray blob next to a much smaller oval shape orbiting it, just barely visible, but getting closer as the probe's momentum carried it forward. Chaeyoung drew a box around the blob on her EAR, plucked out the strange shape, and flicked it to Liam.

"Do you know what the resolution is on this?"

The blob—an object of interest—had a shape resembling an arrowhead. The sharp edge and notches near the bottom were a ruddy white common to icy planets that formed at the edges of star systems, like in Sol's Kuiper belt. There were striations visible from reflected light of Mu Herculis A, the largest of the four stars, but at the current resolution it was like someone had made a painting and mistakenly mixed some of the black of space with the white of the rings.

Liam looked over at her. "At this distance, it's about twenty-four pixels wide."

"Not much better than Jiuhe from here—oke deploy the main telescope."

"Deploying the main telescope now."

Light lag to the probe was only a few moments.

"Telescope is deployed...streaming...now," Liam said.

“Oke, looks like we are getting some initial spectral results,” she rubbed the scar on her left lip, and read the results as they streamed in. “Oke, water, ice, tholins—consistent with methanogenic biosignatures—more likely abiotic, though.”

“Oh, my god! Look at that!”

In the center of the visual data streaming in, in glorious high resolution and unmistakable detail, there was a spacecraft, partially melted into ruddy ice. It had a large, flat, oval shape.

LiDAR from the probe showed the size of the derelict was several hundred meters long and around one hundred and fifty wide. A split part of the craft revealed twisted and tattered fibers, panels, and struts, as if someone had gashed it open with a dull and jagged and cold knife edge. As the oblong shape rotated, tracked by the science probe, the stream showed four very large rocket nozzles frozen underneath clear ice. Each nozzle was an order of magnitude larger than Jiuhe’s main engines.

The stream zoomed in further as the telescope on the probe calibrated, it adjusted and tracked something on the surface. At first, it was not clear to her what it was—it seemed to pop into and out of the camera like glitching pixels. Then, slowly, the image stabilized.

Immediately, the visual caused her stomach to knot up. It was an oval shape with spiraling ridges. It looked like a hatchway or *domot*.

And whatever the patterning was over its surface, it caused her significant distress and fear.

Disgust was her body's reaction to the strange black and white patterning, as if she was looking at a diseased and pustule covered patch of skin, filled with unnatural partially filled holes. On LiDAR it was flat, clean, smooth, and perfectly even surface in the false color of raw data. Yet somehow, it induced a kind of visual effect akin to trypophobia. Again, on LiDAR, there was nothing about the hatchway that should have been disturbing.

"Oh my god," Liam gasped with a stomach-churning belch.

"What is that thing?"

"It's not human," she muttered as she held her rumbling stomach.

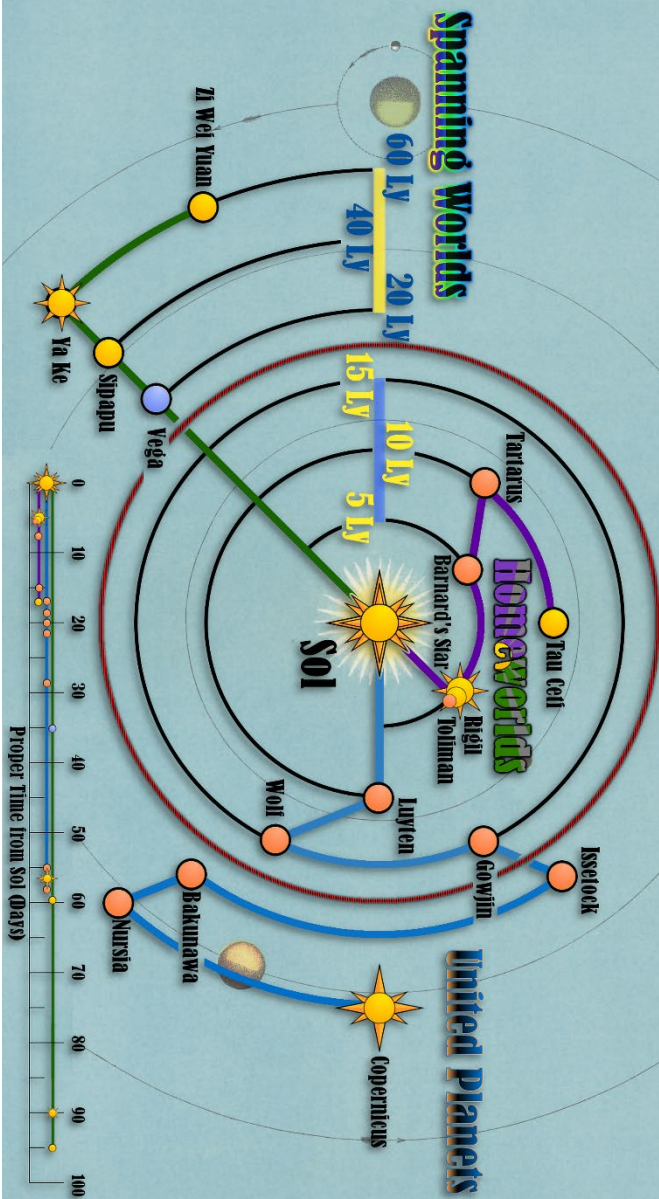
ONE PAGERS
[PERSONAL USE]
EYES ONLY



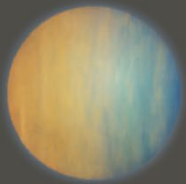
Chen, A. [341-00-0307-511-808379]
Chen-[147-25-225]-[163-791-6570]

[01] CHARTS, MAPS, AND DIAGRAMS

INHABITED SPACE



MOONS OF JIN



JIN

Jin
Star: Ya Ke
Type: Gas giant
Exclusion Zone: 1.171 Gm
Population: 24.02 mil.
Moons: 79 (7 primary)



Skarda

Fourth Moon of Jin

Gravity: 0.26 g
Population: 8.52 million
+2.05 million on orbit
Cosmodromes: Arco lazuli, Tay Jinchang,
Nova Chuanwu, Portu Grond



Vas

Third Moon of Jin

Gravity: 0.34 g
Population: 7.30 million
+1.75 million on orbit
Cosmodromes: Vas Central Cosmodrome,
Infernis Planitia Cosmodrome



Plomo

Fifth Moon of Jin

Gravity: 0.21 g
Population: 1.82 million
+0.39 million on orbit
Cosmodromes: Anchuan Hefushe, Arco Sweet Water,
Bul Aqua Archbeam



Suseong, Peng, Kobber, Prata

Jin's population primarily resides on one of the three primary moons (Skarda, Vas, or Plomo) with the remainder either on orbit in stations like Horizon's Edge, or on the remaining primary moons with the exception of Prata which is heavily irradiated by Jin's radiation belts and is entirely uninhabited.

IKSA CT-185 “El Cajon”

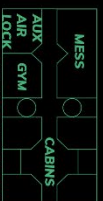
Introducing the IKSA CT-185 “El Cajon,” a revolutionary spacecraft that puts the power of space exploration in your hands. With IKSA’s classic additively manufactured schematic, you can print and assemble your very own El Cajon, customizing it to your specific needs. This DIY approach not only saves you resources but also allows for a deeper understanding and appreciation of your spacecraft.

The El Cajon offers a spacious 14.83 m³ of active space per crew, ensuring comfort during long journeys. With a stowage capacity of 4,300 food days and a Bio-Life Support System (BLSS) providing 6.5 food days of support, you can embark on extended missions with confidence.

To complete your El Cajon, IKSA provides you with a state-of-the-art fusion drive and licensed transporter, enabling efficient hybrid propellant fusion-driven propulsion. The convenient “full craft” spin-up design allows for versatile gravity control, making the El Cajon well-suited for operations at 30%, 60%, or 36% of standard spin-gravity.

Experience the pride and satisfaction of building your own spacecraft while benefiting from IKSA’s cutting-edge technology.

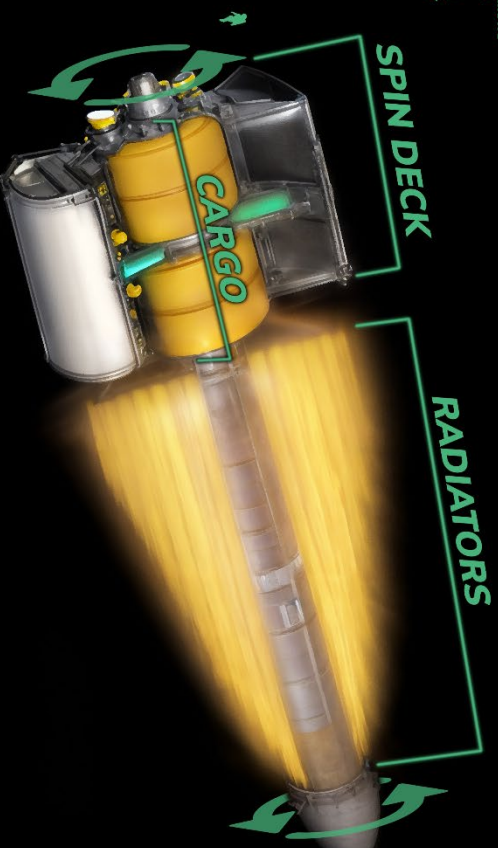
SPIN DECK LAYOUT [01]



SPIN DECK LAYOUT [02]

Iktomi Space & Aeronautic Licensed Spacecraft Schematic

148 dry tonnage | 80 tons cargo | 105 tons bioprop
max accel. 1.91 m/s² | ΔV 44.23 km/s



The CT-185 “El Cajon” is your gateway to the stars,
offering unparalleled customization, comfort, and performance.

[02] PERSONS OF INTEREST

Arad, Taliya

Arad, T. [325-07-0101-011-048099]

Arad-[232-05-220]-[859086]

Call Sign: Sarge [Deprecated]

Birthplace: Vega, Ahtash

Birth Year (Earth Reckoning): 2325

Gender: W

Height: 174 cm

- 2342: EVA qualified.
- 2356: LSS certified.
- 2360: Ya Ke Immigration registered on IBIS.
- 2360: Orbital control qualified.

[Domot Get Grond Dey (*Han Oblast*) records unavailable]

- 2368: Member in good standing attached to SSV Ergo Infinitum.

Service Jacket:

- 2343: Enlists in Cooperative Aerospace Defense Services of the SWI [CADSS] Marines.
- 2344: Medal of Distinction for bravery above and beyond the call of duty [Second Battle of Clymene].
- 2345: Wounded in the Battle of Al Alya.
- 2347: Honorably Discharged.

Blanco, Isabell [Ninya Blanca]

Blanco, I. [346-00-0071-011-247946]

Call Sign: *Ninya Blanca*

Birthplace: Earth

Birth Year (Earth Reckoning): 2346

Gender: W

Height: 167 cm

- 2359: Earth Emigration registered on IBIS.
- 2362: Reported missing (Callisto Orbital Jurisdiction).
- 2365: Detained on Luna for unauthorized immigration to Earth.

[RECORDS SEALED, CODE-WORD CLEARANCE]

- 2366: Member in good standing attached to Grayson Services Group.

Chen, Anya Luciana [Copper Wing]

Chen, A. [341-00-0307-511-808379]

Chen-[147-25-225]-[163-791-6570]

Call Sign: Copper Wing

Birthplace: Titan, Central Shangdu

Birth Year (Earth Reckoning): 2341

Gender: W

Height: 186 cm

- 2356: Space Surface Maintenance apprenticeship.
- 2358: Aerospace engineering qualified.

Service Jacket:

- 2358: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 8th fleet (Issetock), Recon. EVA and Atmo Ops.
- 2362: Transferred to 2nd fleet (Pluto), Small Craft Operations [SCO]
- 2363: Recommended for Selection Candidacy in 8th Special Operation Wing [SOW], Exotic Operations Group.
- 2363: 8th SOW qualified.
- 2363: Deployed to Adeyemi Balanza-Llach cloud [Rigil Toliman AO].
- 2365: Recommended for Officer Selection Candidacy in 9th Special Operation Wing [SOW], Ghost Operations and Reconnaissance Group.
- 2366: Commissioned as Operations Lieutenant [9th SOW].
- 2366: Deployed to UNSV Umbra [Sol AO].
- 2368: Promoted to Lieutenant Commander.
- 2369: UNSV Umbra reassigned to Wolf AO.
- 2371: Promoted to Commander.
- 2371: Deployed to UNSV Enenra [Copernicus AO].

Cordova, Nyghel [Green Dragon]

Cordova, N. [348-11-0101-022-408935]

Cordova-[141-08-110]-[564-58-7424]

Call Sign: Green Dragon

Birthplace: Olentsi, Special Political Zone

Birth Year (Earth Reckoning): 2348

Gender: M

Height: 178 cm

Service Jacket:

- 2366: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 3rd fleet (Copernicus), Recon. ELINT.
- 2370: Recommended for Selection Candidacy in 1st Special Operations Wing [SOW], Intelligent Support Activity and Reconnaissance.
- 2371: 1st SOW qualified.
- 2371: Deployed to Olentsi, Special Political Zone [Sipapu AO].

Daniels, Ty

Daniels, T. [328-00-0000-022-243176]

Call Sign: None

Birthplace: Earth

Birth Year (Earth Reckoning): 2328

Gender: M

Height: 188 cm

Service Jacket:

- 2345: Member in good standing attached to Wharton and Wake.
- 2350: Member in good standing attached to Grayson Services Group.
- 2351: Earth Emigration registered on IBIS.

Devi, Ami

Devi, A. [342-00-0073-031-072203]

Devi-[313-03-320]-[163-791-6570]

Call Sign: None

Birthplace: Earth

Birth Year (Earth Reckoning): 2342

Gender: NB

Height: 173 cm

Service Jacket:

- 2358: Earth Emigration registered on IBIS.
- 2360: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 2nd fleet (Pluto), Infantry.
- 2365: Other than Honorably Discharged.
- 2365: Member in good standing attached to Grayson Services Group.

Flores, Liam

Flores, L. [312-00-0001-022-099132]

Call Sign: None

Birthplace: Earth

Birth Year (Earth Reckoning): 2312

Gender: M

Height: 185 cm

- 2346: Earth Emigration registered on IBIS.
- 2347: EVA qualified.
- 2348: Joins Jay Sea collaboration as junior scientist.
- 2358: Ya Ke Immigration registered on IBIS.
- 2358: Appointed as Senior Scientist for Bukman Institute of Biological Sciences [Beebs] Ahtash field research.
- 2358: Citizen in good standing with Spanning Worlds Independence.
- 2360: Vega Immigration registered on IBIS.
- 2368: Ya Ke Immigration registered on IBIS.
- 2368: Member in good standing attached to Acheron Private Capital Group.

Garcia, Roderick

Garcia, R. [338-16-0112-522-717877]

Call Sign: None

Birthplace: Tau Ceti, Shennong

Birth Year (Earth Reckoning): 2338

Gender: M

Height: 210 cm

- 2356: Member in good standing attached to Acheron Private Capital Group.
- 2362: Citizen in good standing with United Planets of the Local Bubble.
- 2362: Spanning Worlds Independence Emigration registered on IBIS.
- 2362: Member in good standing attached to Grayson Services Group.

Harris-Walker, Angelo

Harris-Walker, A. [349-09-0106-022-367167]

Harris-Walker-[143-08-110]-[929-593-3075]

Call Sign: Aswang

Birthplace: Bakunawa, Marindaga

Birth Year (Earth Reckoning): 2349

Gender: M

Height: 180 cm

Service Jacket:

- 2367: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 4th fleet (Bakunawa), Recon. EVA and Atmo Ops.
- 2369: Recommended for Selection Candidacy in 9th Special Operation Wing [SOW].
- 2370: 9th SOW qualified.
- 2371: Deployed to UNSV Enenra [Copernicus AO].

Ibrahim, Azikiwe [Smiles]

Ibrahim, A. [345-00-0235-022-386243]

Ibrahim-[147-21-110]-[778-297-6035]

Call Sign: Smiles

Birthplace: Mars, Elysium Lake

Birth Year (Earth Reckoning): 2345

Gender: M

Height: 212 cm

Service Jacket:

- 2267: Graduates with a degree in Systems and Decision Sciences from United Planets Special Tactics and Warfare Academy [Triton].
- 2367: Commissioned as Operations Lieutenant in United Planets of the Local Bubble 3rd Special Operations Wing [SOW], Special Forces Group Troop Operations.
- 2367: Recommended for Selection Candidacy in 9th Special Operation Wing [SOW], Ghost Operations and Reconnaissance Group.
- 2368: 9th SOW qualified.
- 2368: Deployed to UNSV Umbra [Sol AO].
- 2369: UNSV Umbra reassigned to Wolf AO.
- 2371: Deployed to UNSV Enenra [Copernicus AO].

Jakande, Peter [Mimo]

Jakande, P. [335-00-0201-022-099132]

Call Sign: None

Birthplace: Mars, Elysium Lake

Birth Year (Earth Reckoning): 2335

Gender: M

Height: 208 cm

- 2352: ERR-AL Maintenance Qualified, EVA qualified, 2 years internship.
- 2356: Graduated from University of Mars Elysium, degrees in Physics, Applied ERR-AL Physics.
- 2360: Graduated from Huygens University.
 - Thesis: Utilization of Non-Abelian Discrete Groups to Improve Autonomous Algorithm Targeting in ERR-AL Drive Design and Validation.
 - Advisor: Sizomu, Ari.
- 2360: Appointed to postdoctoral research fellowship at Callisto Tech.

[RECORDS SEALED, CODE-WORD CLEARANCE]

Johnson, Luca [Hammerhead]

Johnson, L. [347-01-0104-242-196252]

Johnson-[143-04-142]-[821-907-8804]

Call Sign: Hammerhead

Birthplace: Copernicus, Gamov

Birth Year (Earth Reckoning): 2347

Gender: NB

Height: 178 cm

Service Jacket:

- 2359: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 3rd fleet (Copernicus), Recon. MASINT.
- 2369: Recommended for Selection Candidacy in 9th Special Operation Wing [SOW], Ghost Operations and Reconnaissance Group.
- 2370: 9th SOW qualified.
- 2371: Deployed to UNSV Enenra [Copernicus AO].

Jones-Diaz, Ai [Betty Blue]

Jones-Diaz,A. [349-11-0101-011-407715]

Jones-Diaz-[141-08-220]-[740-159-9615]

Call Sign: Betty Blue

Birthplace: Olentsi, Special Political Zone

Birth Year (Earth Reckoning): 2349

Gender: W

Height: 170 cm

Service Jacket:

- 2366: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 3rd fleet (Copernicus), Recon. MASINT.
- 2370: Recommended for Selection Candidacy in 1st Special Operations Wing [SOW], Intelligent Support Activity and Reconnaissance.
- 2371: 1st SOW qualified.
- 2371: Deployed to Olentsi, Special Political Zone [Sipapu AO].

Juhasz, Io Park

Juhasz, I. P. [340-13-0109-011-907348]

Call Sign: None

Birthplace: Rigil Toliman, Chiron

Birth Year (Earth Reckoning): 2340

Gender: W

Height: 165 cm

- 2360: Ya Ke Immigration registered on IBIS.
- 2362: EVA qualified.
- 2366: Orbital control qualified.
- 2366: Member in good standing attached to SSV Ergo Infinitum.

Kim, Chul-soon [Joker One]

Kim, C.S. [344-00-1801-022-500464]

Kim-[143-12-110]-[426-830-3273]

Call Sign: Joker One

Birthplace: Ceres

Birth Year (Earth Reckoning): 2344

Gender: M

Height: 187 cm

Service Jacket:

- 2362: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 2nd fleet (Pluto), Small Craft Operations [SCO]
- 2364: Recommended for Selection Candidacy in 8th Special Operation Wing [SOW], Exotic Operations Group.
- 2364: 8th SOW qualified.
- 2364: Deployed to Adeyemi Balanza-Llach cloud.
- 2365: Recommended for Selection Candidacy in 9th Special Operation Wing [SOW], Ghost Operations and Reconnaissance Group.
- 2366: 9th SOW qualified.
- 2366: Deployed to UNSV Umbra [Sol AO].
- 2369: UNSV Umbra reassigned to Wolf AO.
- 2371: Deployed to UNSV Enenra [Copernicus AO].

Kim, Kirk

Kim, K. [336-02-0287-022-245792]

Call Sign: None

Birthplace: Ya Ke, Horizon's Edge

Birth Year (Earth Reckoning): 2336

Gender: M

Height: 180 cm

- 2355: EVA qualified.

[*Domot Get Grond Dey (Han Oblast)* records unavailable]

- 2362: Astrogation qualified.
- 2364: Orbital control qualified.
- 2366: Member in good standing attached to SSV Ergo Infinitum.

Larsen, Hakon

Larsen, H. [336-02-0223-022-317529]

Call Sign: None

Birthplace: Ya Ke, Skarda

Birth Year (Earth Reckoning): 2336

Gender: M

Height: 180 cm

- 2355: EVA qualified.
- 2356: Waste specialist qualified.
- 2366: Member in good standing attached to SSV Ergo Infinitum.

McBride, Michael [Gray Top]

McBride, M. [330-00-0108-022-240781]

McBride-[141-12-110]-[251-474-4917]

Call Sign: Gray Top

Birthplace: Luna

Birth Year (Earth Reckoning): 2330

Gender: M

Height: 194 cm

Service Jacket:

- 2347: EVA qualified.
- 2350: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 8th fleet (Issetock), Basic Intelligence Marine, IMINT Infantry.
- 2354: Deployed UPLB-MC, 1st fleet (Sol), Basic Intelligence Marine, Counter-Intel.
- 2358: Recommended for Selection Candidacy in 7th Special Operations Wing [SOW], Gravity Well Operations Group.
- 2359: 7th SOW qualified.
- 2359: Deployed to Adeyemi Balanza-Llach cloud.
- 2363: Recommended for Selection Candidacy in 1st Special Operations Wing [SOW], Intelligent Support Activity and Reconnaissance.
- 2364: 1st SOW qualified.
- 2364: Deployed to Olentsi, Special Political Zone [Sipapu AO].

Murphy, Ciara [Pele]

Murphy, C. [346-00-0361-011-159061]

Murphy-[143-01-220]-[480-727-8001]

Call Sign: Pele

Birthplace: Titan, Exterior Andiri

Birth Year (Earth Reckoning): 2346

Gender: W

Height: 191 cm

Service Jacket:

- 2364: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 8th fleet (Issetock), Force Recon.
- 2364: Deployed to UPLB-MC, 2nd fleet (Pluto), Small Craft Operations [SCO]
- 2367: Recommended for Selection Candidacy in 9th Special Operation Wing [SOW], Ghost Operations and Reconnaissance Group.
- 2368: 9th SOW qualified.
- 2368: Deployed to UNSV Umbra [Sol AO].
- 2369: UNSV Umbra reassigned to Wolf AO.
- 2371: Deployed to UNSV Enenra [Copernicus AO].

Nguyen, Anna [Red Cap]

Nguyen, A. [348-11-0101-011-539541]

Nguyen-[141-08-220]-[821-798-5803]

Call Sign: Red Cap

Birthplace: Olentsi, Special Political Zone

Birth Year (Earth Reckoning): 2348

Gender: W

Height: 168 cm

Service Jacket:

- 2365: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 5th fleet (Luyten), Force Recon CYBINT.
- 2369: Enlists in United Planets of the Local Bubble Marine Corps [UPLB-MC], 8th fleet (Issetock), OPINT.
- 2369: Recommended for Selection Candidacy in 1st Special Operations Wing [SOW], Intelligent Support Activity and Reconnaissance.
- 2370: 1st SOW qualified.
- 2370: Deployed to Olentsi, Special Political Zone [Sipapu AO].

No, Chaeyoung

No, C. [339-07-0101-011-877884]

Call Sign: Little Bird

Birthplace: Vega, Ahtash

Birth Year (Earth Reckoning): 2339

Gender: W

Height: 169 cm

- 2347: Ya Ke Immigration registered on IBIS [Minor].
- 2356: Sol Immigration registered on IBIS [Minor].
- 2357: EVA qualified.
- 2361: Graduated from Huygens University with a degree in Astrobiology, Xenobiology, and Biochemistry [AXB].
- 2362: Published "*The Paradoxical Dearth of Exobiological Examples: Re-Examining Probabilities in light of Ahtash and Europa*. No, C. Qureyshi, S."
- 2364: Graduated from Huygens University.
 - Thesis: Understanding Vega's Local Stellar Environment and History: Implications for Early Ahtashian Evolutionary Models.
 - Advisor: Medvedev, Irina.
- 2364: Postdoctoral appointment in Jay Sea collaboration.
- 2364: Vega Immigration registered on IBIS.
- 2365: Desert survival qualified.
- 2366: Postdoctoral appointment at Bukman Institute of Biological Sciences [Beebs].
- 2366: Ya Ke Immigration registered on IBIS.
- 2367: Member in good standing attached to Acheron Private Capital Group.

Obialo, Charles

Obialo, C. [349-02-0223-022-025632]

Call Sign: None

Birthplace: Ya Ke, Skarda

Birth Year (Earth Reckoning): 2349

Gender: M

Height: 202 cm

[Domot Get Grond Dey (Han Oblast) records unavailable]

- 2365: Member in good standing attached to SSV Ergo Infinitum.

Obialo, Diya

Obialo, D. [358-02-0299-011-512523]

Call Sign: None

Birthplace: Ya Ke, Jin Orbital Jurisdiction

Birth Year (Earth Reckoning): 2358

Gender: W

Height: 175 cm

[*Domot Get Grond Dey (Han Oblast)* records unavailable]

- 2372: Member in good standing attached to SSV Ergo Infinitum.

Obialo, Frederik [Eff]

Obialo, F. [335-02-0223-022-720855]

Call Sign: Eff or F

Birthplace: Ya Ke, Skarda

Birth Year (Earth Reckoning): 2335

Gender: M

Height: 198 cm

[Domot Get Grond Dey (Han Oblast) records unavailable]

- 2365: Member in good standing attached to SSV Ergo Infinitum.

Ocampo, Margel

Ocampo, M. [343-02-0223-022-317529]

Call Sign: None

Birthplace: Ya Ke, Skarda

Birth Year (Earth Reckoning): 2343

Gender: M

Height: 189 cm

- 2361: EVA qualified.
- 2362: Waste specialist qualified.
- 2370: Member in good standing attached to SSV Ergo Infinitum.

Patel, Melisa

Patel, M. [345-02-0101-011-085185]

Call Sign: None

Birthplace: Ya Ke, Celosia

Birth Year (Earth Reckoning): 2345

Gender: W

Height: 164 cm

- 2367: Graduated from Bukman Institute of Biological Sciences [Beebs] with a degree in Astrobiology, Xenobiology, and Biochemistry [AXB].
- 2367: Enrolled in Doctoral Program at Beebs for Astrobiology, Xenobiology, and Biochemistry [AXB]
- 2368: Member in good standing attached to Acheron Private Capital Group.
- 2370: EVA qualified.

Peyton, Ali

Peyton, A. [335-04-0204-022-174694]

Call Sign: None

Birthplace: Nursia, Benedict

Birth Year (Earth Reckoning): 2335

Gender: M

Height: 186 cm

- 2356: Graduated from University of La Silla, degrees Applied ERR–AL Physics and Materials Science.
- 2356: Sol Immigration registered on IBIS.
- 2360: Graduated from Huygens University.
 - Thesis: Bridging the Gap Between Theory and Experiment in ERR–AL Physics with a Multifaceted Approach
 - Advisor: Kuznetsov, Ulan Nguyen
- 2360: Appointed to postdoctoral research fellowship at Callisto Tech.

[RECORDS SEALED, CODE-WORD CLEARANCE]

Qureyshi, Sania

Qureyshi, S. [339-07-0101-011-206362]

Call Sign: None

Birthplace: Vega, Ahtash

Birth Year (Earth Reckoning): 2339

Gender: W

Height: 173 cm

- 2347: Ya Ke Immigration registered on IBIS [Minor].
- 2357: EVA qualified.
- 2361: Graduated from Al Alya with a degree in Astrobiology, Xenobiology, and Biochemistry [AXB].
- 2362: Published "*The Paradoxical Dearth of Exobiological Examples: Re-Examining Probabilities in light of Ahtash and Europa*. No, C. Qureyshi, S."
- 2364: Graduated from Bukman Institute of Biological Sciences [Beebs].
 - Thesis: Revisiting Early Ahtash Evolutionary Theories.
 - Advisor: Singh, Ravi.
- 2364: Postdoctoral appointment in Jay Sea collaboration.
- 2364: Vega Immigration registered on IBIS.
- 2365: Desert survival qualified.
- 2366: Postdoctoral appointment at Bukman Institute of Biological Sciences [Beebs].
- 2366: Ya Ke Immigration registered on IBIS.
- 2367: Member in good standing attached to Acheron Private Capital Group.
- 2367: Certification of civil union with Munir, Piran registered on IBIS.
- 2368: Dissolution of member certification [Acheron Private Capital Group] registered on IBIS.
- 2368: Certification of birth for Munir, Neya and seal custodianship application on behalf of a minor registered on IBIS.

Sato, Luiz

Sato, L [325-00-0036-022-588591]

Sato-[347-25-110]-[310-061-3399]

Call Sign: Well Born

Birthplace: Earth

Birth Year (Earth Reckoning): 2325

Gender: M

Height: 183 cm

Service Jacket:

- 2341: Earth Emigration registered on IBIS.
- 2342: Fast track 9th Special Operations Wing [SOW] training program, Ghost Operations and Reconnaissance Group.
- 2342: Achievement Medal [Chiron Blockade, Rigil Toliman AO].
- 2342: Achievement Medal [Battle of the Triquetra Cloud, Rigil Toliman AO].
- 2344: Commendation Medal [Battle of the Belt, Rigil Toliman AO].
- 2344: Awarded Order of the Star [Battle of Salacia, Sol AO].
- 2345: Recommended for Officer Selection Candidacy in 9th Special Operation Wing [SOW], Ghost Operations and Reconnaissance Group.
- 2346: Commissioned as Operations Lieutenant.
- 2346: Deployed to UNSV Tulpar [Copernicus AO].
- 2350: Deployed to UNSV Arion [Gowjin AO].
- 2352: Deployed to UNSV Nuckelavee [Nursia AO].
- 2354: Promoted to Lieutenant Commander.
- 2354: Deployed to UNSV Buraq [Wolf AO].
- 2362: Promoted to Commander.
- 2362: Deployed to UNSV Umbra [Sol AO].
- 2369: UNSV Umbra reassigned to Wolf AO.
- 2371: Other than Honorably Discharged.

[RECORDS SEALED, CODE-WORD CLEARANCE]

Silva, Vis-viva [Vis]

Silva, V. [338-00-0214-011-891935]

Call Sign: Vermillion Special

Birthplace: Mars, Elysium Lake

Birth Year (Earth Reckoning): 2338

Gender: W

Height: 186 cm

- 2356: ERR-AL injection laser maintenance qualified.
- 2356: Eva qualified.
- 2358: Agronomy certified.
- 2359: Graduate from University of Mars Elysium, degrees in Physics, Applied ERR-AL Physics.
- 2362: Graduated from Callisto Institute of Technology.
 - Thesis: Explorations of anti-De Sitter pocket bulk spaces in short-lived ERR-AL vacuums: better analytics for better automatics.
 - Advisor: Iwasaki, Hikaru.

[RECORDS SEALED, CODE-WORD CLEARANCE]

- 2366: Ya Ke Immigration registered on IBIS.
- 2366: Physics educator, Celosia, Ya Ke.
- 2368: Member in good standing attached to Acheron Private Capital Group.

Tsai-Adeyemi, Edouard

Tsai-Adeyemi, E. [334-02-0101-022-386449]

Call Sign: None

Birthplace: Ya Ke, Celosia

Birth Year (Earth Reckoning): 2334

Gender: M

Height: 164 cm

- 2356: Graduated from Bukman Institute of Biological Sciences [Beebs] with a degree in Biomedical Engineering.
- 2360: Graduated from Bukman School of Medicine.
- 2360: Appointed to medical residency at Infernis Planitia Medical Center.
- 2363: Appointed to medical specialty fellowship [Space Medicine] at Marassa Jumeaux Surgery Medical Center.
- 2366: EVA qualified.
- 2366: Appointed to medical specialty fellowship [Emergency Medicine, Space] at Arco Lazuli Medical Center.
- 2368: Member in good standing attached to SSV Ergo Infinitum.

Vasquez, Chris de Laval

Vasquez, C.dL. [347-02-0223-022-688426]

Call Sign: None

Birthplace: Ya Ke, Skarda

Birth Year (Earth Reckoning): 2347

Gender: M

Height: 195 cm

[*Domot Get Grond Dey (Han Oblast)* records unavailable]

- 2370: Member in good standing attached to SSV Ergo Infinitum.

Zhang-Zidane, Gazala

Zhang-Zidane, G. [328-00-1800-011-039598]

Call Sign: None

Birthplace: Ceres

Birth Year (Earth Reckoning): 2328

Gender: W

Height: 189 cm

- 2346: Member in good standing attached to CIS Lunar Industries.
- 2351: Registered as a diplomatic liaison in good standing for both Near-Earth Exchange Rihanex and Bicameral Congress of the United Planets of Sol [BCUPS] on IBIS.
- 2362: Registered as civilian oversight attaché to Exotic Research Commission Oversight Committee on IBIS.
- 2371: Registered as Minister to the Diplomat of the Spanning Worlds Independence Embassy in Copernicus on IBIS.
- 2371: Member in good standing with diplomatic registration in the Spanning Worlds Independence.
- 2371: Member in good standing with diplomatic registration in the United Planets.

Ziu-Ortiz, Omolara

Ziu-Ortiz, O. [345-00-0402-011-601587]

Ziu-Ortiz-[147-24-220]-[780-388-1475]

Call Sign: Eagle Eye

Birthplace: Callisto, Svol Ring

Birth Year (Earth Reckoning): 2345

Gender: W

Height: 190 cm

Service Jacket:

- 2365: Graduated from Callisto Institute of Technology, Svol with a degree in Environmental Engineering.
- 2365: Enrolls in Special Tactics and Warfare Academy (Callisto) officer fast-Track program.
- 2367: Recommended for Officer Selection Candidacy in 8th Special Operation Wing [SOW], Exotic Operations Group.
- 2368: 8th SOW qualified.
- 2368: Commissioned as Operations Lieutenant [8th SOW].
- 2368: Deployed to Sol AO.
- 2368: Recommended for Officer Selection Candidacy in 9th Special Operation Wing [SOW], Ghost Operations and Reconnaissance Group.
- 2370: Commissioned as Operations Lieutenant [9th SOW].
- 2370: Deployed UNSV Umbra [Wolf AO].
- 2370: Promoted to Lieutenant Commander.
- 2371: Deployed to UNSV Enenra [Copernicus AO].

[03] COMMON TERMS

Acceleration Flat

An acceleration flat, or more simply a flat, is a padded structure to cushion and contain the occupant during high acceleration maneuvers in space. It has become a generic term for any padded couch, chair, bed, cot, or stretcher.

Arte Steh

A Martian word describing a person from Earth. *Arte myawn* is commonly used when referring to the people of Earth collectively.

AlKapThil

An aluminum based ceramic composite used for electronics manufacturing, space applications, and additive manufacturing processes. It is a teal-green blue color, reflective, flexible, and lightweight.

Biosuit

A type of spacesuit that uses shape-memory alloy mechanical counter-pressure rather than a pressurized air volume to maintain body pressure in vacuum. This avoids the "constant volume" problem of traditional soft suits, and as such affords a greater degree of mobility. Biosuits require thick gloves and large helmets, and most biosuits are worn with an aesthetic, protective, or otherwise utility exterior layer over the counter-pressure straps.

Celarium

A Martian term for arcologies, or arcologically inspired technologies, derived from the controlled ecological life-support systems (CELSS) pioneered on Mars. The term denotes an enclosed ecological system, typically with extensive bio-regenerative ecologies or life support supplements. If used to describe a region of a city, or a significant habitat in space, it implies immense scale and high population density.

CHOMP

Combat and Hazardous Operations Modular Platforms, or CHOMPs, are, in essence, six-legged rocket tanks. Thick boron-filament armor doubles as radiation shielding, legs provide locomotion and mobility, and rockets in the legs provide agility and limited propcan-like functionality. Radiators for the significant power system are along the CHOMP underbelly, protected in a carbon fiber mesh. CHOMPs have a crew of three. They have a maximum passenger capacity of eleven. If comfort is a concern maximum occupancy is only six, excluding the three crew.

Cooperative Defense [CADSS]

Cooperative Defense Services of the Spanning Worlds Independence, or more commonly Cooperative Defense or CADSS, is the shared defense services of the Spanning Worlds. With its unusual, federated structure, Cooperative Defense has some branches that have extremely localized chains of command, while others are spread across and managed by all the Spanning Worlds. Consequently, Cooperative Defense splits into seven branches: Consolidated Command (CCC), Joint Atmospheric Operations Corps (C-JAOC), Marine Corps (CMC), Space Corps (CSC), Joint Special Operations Corps (C-JSOC), Joint Intelligence Support Activity (C-JISA), and CADSS Special Activities Unit (C-SAU). Marine Corps and Space Corps branches are extremely localized, while the other branches are jointly operated by different mixtures of the four Spanning Worlds' governments, with consolidated command acting as a more traditional, federal, military branch to oversee and coordinate all other military operations.

Cut Knife

A *cut* knife is a rhenium bladed tool with a battery in the hilt and a special sheath that can quickly heat the rhenium edge to several thousand Kelvin as the knife is drawn. It is an invaluable tool for both cutting and space welding.

The etymology of the word is not entirely clear. One of the two leading theories is that *cut*, the Martian word for a feint, was added to the knife because a *cut* knife is mostly used as a welding and cauterization tool in space. Hence, its design is a feint, or *cut*, because while it is a knife, it is mainly utilized for purposes other than being a sharp edge.

The other leading theory is that the word is a partial reduplication, which is a linguistic feature where a duplicated word intensifies or modifies the meaning of the simple form of the word. Since a knife already cuts, the reduplication with *cut* knife thus implies it cuts more intensely, with heat. This reduplication would have to originate from the earliest Martian dialects, given the contemporary usage of *cut* in *Di Lingua* where, while it refers to feints, is often used in the context where *cut* is understood to be something more akin to bullshit.

Delta-vee

Delta-vee represents the change in velocity. It describes how much a spacecraft, or other space-borne object, can change its velocity, and thus its orbital trajectory.

Di Lingua

This is the Martian language term for the Martian language. Born out of the chaos of the Isolation, this Martian creole has modified grammar structures from commonly spoken Earth languages, a changed phonology, script, and alphabet, and many lexical borrowings from many of Earth's languages. Widely used in inhabited space, excluding Earth, it is the second most spoken language after Upblanda.

EAR

Extraocular Augmented Reality, or EAR, refers to the set of optical, auditory, and haptic wearables or, more commonly, implants that produce augmented reality interfaces that use sight, sound, and touch. However, since this interface technology is ubiquitous, it can also refer to the distributed network technologies that connect embedded devices to user-endpoint EAR interfaces. Thus, the EAR network refers to anything you can access wirelessly through your personal EAR interface.

Earth Reckoning

Refers to any reckoning of time that explicitly depends on an Earth-based calendar. Most often the historical Gregorian calendar, any Earth-based calendar describing dates and times is Earth reckoning.

ERR-AL

Einstein-Rosen-Rojas-Alcubierre-Li, or ERR-AL, is the miraculous application of particle accelerators to exploit properties of the dark matter vacuum to produce intermittent, traversable, wormholes and effective faster-than-light speed. It is also known as *gidizip* in *Di Lingua*, though this usually refers to the act of using an ERR-AL drive rather than the drive itself or the underlying science and technology.

If you travel using an ERR-AL drive, the accelerated reference frame will yield a proper-time penalty. That is, if you were to travel to the furthest reaches of inhabited space and return to Sol, then what was a journey of several days subjectively, also called tau time, would yield months passed from the perspective of your friends and family down the Earth gravity well, also called proper time.

It is more accurate to say the ERR-AL drive decreases the distance between two points in space through a series of short-lived wormholes. These wormholes are produced immediately in front of the axial length of the particle accelerators and are stabilized by a warped subluminal bubble of spacetime—produced transversely by the particle accelerators through the Alcubierre-Li effect. As such, the ERR-AL trajectories through spacetime are generated by particle accelerators replenishing a false vacuum. Thus, for interstellar travel, a spacecraft must either have its own continuously operating particle accelerator or

travel within the wake of one, making ERR-AL energy intensive, size limited, and preventing apparent superluminal communication except through couriers.

Gidizip

The Martian word for using an ERR-AL to travel, less commonly used to refer to the technology itself.

Grond Steh

The Martian word for people from Mars. It is common to use the alternative *Grond myawn* to refer to the Martian people collectively.

Homeworlds Federation

When the Isolation of Earth ended, the planet was still in a period of political, cultural, and environmental turmoil which led to the conditions for the creation of the Homeworlds Federation. In the period after the Alcubierre-Li effect was demonstrated practically, but before the ERR-AL drives were invented, many disgruntled Earthers traveled to the nearest, barely habitable, worlds and created what they believed to be better Homeworlds away from the turmoil of Earth.

Highly idiosyncratic, fundamentally independent, and fractious, the Homeworlds did not unite as a coherent political entity, even within individual star systems. That was not until AG, Earth's largest corporation, completed the K-tube network. While similar in some ways to the Spanning Worlds, the Homeworlds Federation is even more extremely decentralized to where Barnard's star's contribution to the Federation is via a handful of military outposts and a significant weapons trade, with essentially no other diplomatic, governmental, economic, or cultural ties to the rest of the federation.

Current members are Tartarus, Rigil Toliman, Proxima Astraeus, Tau Ceti, and Barnard's star. Rigil Toliman and Proxima Astraeus are technically a single system composed of three stars that form the Adeyemi Balanza-Llach cloud. However, the distance between Proxima Astraeus and the twin Rigil Toliman is over three-hundred and fifty times larger than the distance between Rigil and Toliman individually, so they are traditionally considered separate systems.

HEAT BRACE

A Hardsuit for Extravehicular Activity and Transport in Biological, Radiological, Atmospheric, or Contaminated Environments, aka HEAT BRACE, is a large hardsuit designed to be operated in extreme

environments, particularly those that contain radiological hazards. HEAT BRACEs have extensive power systems and life support that allow self-sufficient operation for prolonged periods of time.

IBIS

Interstellar Block Investment System, or IBIS, is a distributed encrypted digital system used to maintain data and seal dates for pDAOs, corporations, governments, and non-governmental organizations. If local forks of IBIS are included, it is used on every world of every star system except for Barnard's system.

Ink Display

Any thin and lightweight full-color electronic display that uses electric manipulation of physical dye particles to produce high resolution, low power, visual displays. These displays can be static, as the dyes can remain in place without power, or they can be dynamic. Ink displays can come in all sizes, configurations, and topologies.

K-tube/K-station

The K-tube, K-tube network, and K-stations are a collection of autonomously operated ERR-AL spacecraft and attendant stations that yield increased access to interstellar travel while also increasing the apparent speed of transit between stars.

Utilization of compact autonomous ERR-AL capable crafts enables the creation of massive wakes of traversable wormholes and produces a mega-structure known as a Krasnikov tube. These temporary structures are not made of physical material, but the temporary warping of spacetime around the ERR-AL drives of various autonomous craft which regenerate a speed-boosting effect for return travel.

By circulating K-tube autos back and forth between stars along these so-called Krasnikov tubes, this effect can be exploited to decrease interstellar travel times. It is even possible for purely Newtonian craft, which is spacecraft without an ERR-AL drive, to achieve interstellar travel by following the wakes of the K-autos, and even ERR-AL capable spacecraft see a significant boost to apparent superluminal speed.

One downside to the K-tube network is the relative velocities between star systems are quite large. Even with clever ERR-AL trajectories that cancel out as much of the relative velocities between stars as possible, spacecraft utilizing the K-tubes must spend huge amounts of delta-vee to be brought on orbit around the local star. This necessitates the use of hybrid propellant fusion-driven rockets that can yield high thrust and high delta-vee, but this also creates the largest constraint to travel along the K-tube network.

Large fusion tugs that can bring large spacecraft and carry significant cargo payloads reduce the cost of these constraints and, along with the speed boosts of the K-tube network, dramatically lower the barrier to entry for interstellar travel. In fact, of the nearly one million spacecraft that take part in interstellar trade every Solar year, nearly two-thirds are not ERR-AL capable. Even three-quarters of the ERR-AL capable spacecraft use fusion tug services to conserve their own delta-vee budgets.

Propcan

Propcan, or propulsion can, refers to any chemical or nuclear-powered Newtonian rocket without many thrills or frills, simply an enclosed space that can, at least in theory, be pressurized. If a spacecraft is just a rocket nozzle, propellant tanks, and a flat to sit in, that's a rocketcan.

Rihanarchia, Rihanarchism, Rihanarchist, Rihanex

Rihanarchia is Earth's unified governance and economic system where decision-making is driven by betting, futures, or other predictive market mechanisms derived from the liberalized market principles of "rihan" or bet making.

A Rihanex organization is a corporate entity, autonomous organization, or platform that operates on Rihanarchism principles, engaging in trading, investments, or market operations that leverage predictive and betting market strategies to deliver value to stakeholders.

Seal/Seal Codes

A seal is a roughly thumb-sized quantum cryptographic device designed to utilize IBIS to authenticate identities. By being biometrically linked to the user, fully end-to-end encrypted transactions are possible, and thus the seal is used for signing contracts, communication, and electronic access control among other applications. Users can use seals over an EAR network or physically interact with a seal reading device.

Seal codes are a particular type of EAR readable visual code that can compress and transmit a seal-based cryptographic handshake. If you have a seal that was not intended to access a particular seal-code, it is indecipherable.

Spanning Worlds Independence

If viewed from a three-dimensional representation of the galaxy, the four stars in the Spanning Worlds—Sipapu, Vega, Ya Ke, and Zi Wei Yuan—appear to flank, or span, the United Planets. Collectively, the Spanning Worlds are the furthest stars from Sol by significant margins, and the proper time to travel to these stars from Sol takes on the order of months.

As a result, communication and coordination between Sol and the Spanning Worlds is incredibly challenging, a fact that created insurmountable cultural, economic, and political tensions that ultimately led to these former United Planets worlds declaring their independence. Average travel times among the Spanning Worlds are shorter than average travel times to Sol yet are still long in absolute terms—a situation that leads to a constant tension between cooperation and independence.

Sol Universal Time

Sol Universal Time is a proper time reckoning where a day is twenty-four hours, a year is three-hundred and sixty-five days, and time is represented by the number of twenty-four-hour days since Day Zero (the groundbreaking day for permanent human habitation on Titan, one of Saturn's moons in the Solar system).

Stellah Steh

The Martian word for anyone born in the Solar system, but not on Earth or Mars. Commonly *stellah myawn* is used when referring to the people from the Solar system, but not Earth or Mars, collectively.

Swawn

The “independent Tonn”, Spanning Worlds won, or *swawn*, (represented by the symbol SW) is the predominant currency of exchange in the Spanning Worlds except for Ahtash that uses the Ahtashi Lira. Not accepted in Barnard's system.

Tonn

The Tonn, represented by the symbol T , is the most used denomination for currency exchanges in the United Planets, and is the second most used currency outside of the United Planets. Not accepted in Barnard's system.

United Planets

The United Planets of the Local Bubble, or UPLB, represents nearly two-thirds of the entire human population and is spread over forty-one light

years. The United Planets currently represents and governs the systems of Sol, Copernicus, Nursia, Bakunawa, Luyten, Gowjin, Wolf, and Issetock and formerly included Vega, Ya Ke, Zi Wei Yuan, and Sipapu. It has a total population approaching thirteen billion, though three-quarters of this population live on Earth. Despite the trope of a meddling Earther, of the nine billion people living on Earth the overwhelming majority have no interest whatsoever in interstellar affairs.

Upblanda

A term that refers to any of the common Earther languages in use in the United Planets, all of which include many borrow-words from *Di Lingua*.

Upper

An often-pejorative term for people from the United Planets of the Local Bubble, though this can also refer to people from either Earth, Sol, or Copernicus more narrowly.

[04] QUALS:

Quantum Algorithmic Ledger System

QUALS is any federated tokening and exchange system that uses time-entangled Qubit Coin distributed ledgers, which are cryptographically verified via seals.

QUALS Forks:

1. Interstellar Block Investment System: IBIS
This is the core block and is the standard implementation of QUALS for interstellar trade. Seal dates for pDAOs, corporations, governments, and non-governmental organizations all exist on the IBIS public ledger. Contains optional zero-knowledge systems.
2. Universal Currency Fork: UCF
This is a fork of IBIS and is the primary QUALS used for currency and market exchange.

TEQ/TEQu (Time Entangled Qubit) is an implementation of the UCF that has many sub-tokens, but as IBIS runs pDAO exchanges over the UCF, it is the “universal” base currency by default.

If you are a “member in good standing” for any entity registered, and itself still in good standing on the IBIS, you can use IBIS tokens to escrow exchanges between currency hard forks, allowing nearly seamless exchange between different UCF based currencies. Only Barnard’s star does not use a UCF forked currency as a medium of exchange.

- The minimum *bah-kay* (*Di Lingua* word for money and a counting particle) of UCF is 10^{-10} .
- The minimum full chain increment is the **UBK** (universal *bah-kay*) which is 10^{-8} .
- **Q**—Smallest typical amount exchanged in transactions; menny, micro bit, six-bit, micro *bah-kay*, *mu bah-kay*, or hex penny is 10^{-6} .
- **T** — “Tonn”. “*Bah-kay*”. “Teq back” - The core, most often traded increment of value is the 10^{-4} “bit”, technically 10,000 times larger than the smallest value on the chain, and 1 million times larger than the smallest possible increment.
- All other bit sizes use standard prefixes.

5. Federated Ledger EXchange [Homeworlds]: FLEX

This is a hard fork of IBIS in use in the Homeworlds Federation that simply adds an extra layer of exchange to verify FLEX/IBIS tokens.

6. Each system in the Homeworlds has a different currency fork:

- a. Chiron Kopeck.
(1 ₪ = 0.05330 ₴ = 533 UBK)
 - i. Used on Chiron and in the Rigil sub-system of Rigil Toliman.
 - ii. Fixed exchange rate to UBK, minimum exchange of 3 ₪ = 16 ϕ.
- b. Toliman Fork.
(1 ₣ = 0.375516 ₪ = 2 ϕ = 200 UBK)
 - i. Fork of Chiron Kopecks.
 - ii. Used in the Toliman sub-system of Rigil Toliman.
 - iii. Basic unit also called a Kopeck.
- c. Zerzura Dinar.
(1 ₮ = 38.99 UBK)
Not very volatile.
- d. Tau Ceti Dollar.
(1 TCD \$ = {3.40,155.03} UBK, 2371)
 - i. Extremely Volatile exchange rate.
 - ii. Day-to-day fluctuation as high as ± 37.91 UBK [Average from 2353-2371].
 - iii. Local scrip currencies of various IBIS registered entities are often used instead of TCDs to reduce volatility in the Tau Ceti economy.
- e. Astraeus Dollar.
(1 APD \$ = 82.08 UBK)
Not very volatile.
- f. Barnard's system uses a fiat currency.

7. Two primary currencies in Spanning Worlds.

- a. Vega uses Ahtashi Lira
(1 ₧ = 3.7970 ₴ = 4.289 ₪).
By default, the Ahtashi Lira is a zero-knowledge system fork, with options to disable this functionality when broadcasting trades associated with IBIS.
- b. Sipapu, Ya Ke, and Zi Wei Yuan use "independent Tonn", Spanning Worlds won, or swawn, (1 ₪ = 0.88521 ₴).

About the author



Alex emerged into the public consciousness in 2497 with the publication of “A Mote in Shadow,” a searing, fictionalized account of the tumultuous period between 2366 and 2372. Focusing on various luminaries of the period, Alex’s “A Mote in Shadow” has sparked intense controversy. Leaving readers pondering profound questions and looming threats is a hallmark of Alex’s work, fueling fierce debate and cementing the book’s status as a seminal piece of 25th-century literature.

Despite intense scrutiny, A.N. Alex remains an elusive figure, eschewing the limelight in favor of letting their work speak for itself. Some whisper that Alex is not one person but many, a collective of writers and thinkers united in their desire to probe the deepest mysteries of the universe who more commonly operate under the handle of LastNPCAlex. Others speculate the author is an AI, an emergent intelligence born from the very xenoliths that lie at the heart of their magnum opus.

A.N. Alex challenges readers with their voice to confront the complexities of a universe where shadows and light intertwine, blurring the line between hero and villain and leaving an indelible mark on the 25th century. As humanity stands on the precipice of a new age, “A Mote in Shadow” shines as a beacon, guiding us through the uncharted waters of a future both wondrous and terrifying in its potential, regardless of the truth behind the mythos.