

PROXI

David Jensen

There were ‘good days’, her father called them, when thick ribbons of opaque atmosphere would billow from the stacks, dense enough for Ganna to breathe without assistance from her small suit. Warm enough to keep her skin from freezing without the heater pressed against her chest. She would stand in that tumbling soup wearing nothing at all. Craning her neck back, looking up.

I want you to promise me you’ll never leave the habitat without your suit, her father had said, his voice edged and chipped, threatening to cut in unexpected ways. *Even on the good days when the stacks are active, all that atmosphere can spread out, thin out, in seconds.*

No air, he kept saying. *Dangerous with no air*. But that only meant she could see the expanse above. When he was not there to stop her, to make her wear a suit, because he was out tending to the stacks towering over the horizon. Ganna could stand in the thick of it and see between the rushing gaps: a small yellow star. Saturated oxygen from the stacks would intoxicate her brain, make the star glow brighter; feel closer. And then she would collapse to the ground, her chest heaving, her lips forming the word: *Sol*. But the euphoria wouldn’t last. Always creeping, like acid up the throat, was the thought: *he would be pleased*. He would. Her tears adding to the meager hydrosphere, her sharp and rapid breaths pumping carbon into the atmosphere, trapping heat from the sun, *their* sun, Proxi. She was one small part of a biosphere he hoped to create, inconsequential to him until it thrived. But it was nowhere close to thriving. All of it only amounted to just a little more heat trapped here, the same as her. A tear from her cheek fell into the sand and was instantly absorbed. *He would be very pleased*. But then he would notice her skin-bare, curled up on the ground outside the habitat’s topside hatch, no suit. And his face would darken again.

One day it will happen. The air outside would permanently thicken to the point of closing the gaps. Painting in thick opaque coats, the window above her head. No stars during the day. Nightfall never visiting the tidally-locked surface. And just like the vast oceans and boreal forests her grandmother spoke of when she still had voice, the rest of Sol would be reduced to dim recollections in silent bodies.

#

72 hours.

Lev's face scowled in the neon red wash of these words. They mocked him from behind the screen. Dangling what he needed most literally above his head, laughing. Resupply from Sol. Launched 156 years ago, a decade after their own departure. It was the only one they sent. Lev would watch the years tick down to months, tick down to days. And now hours. Craning a scope above, Lev could see the burning glow of engines decelerating the uncrewed resupply. But it was in trouble, still approaching too quickly. He was informed the resupply would rely on his atmosphere to aerobreak for orbital insertion.

His atmosphere.

Bestowed upon him in transit to Proxi, when he was younger than Ganna. Lev's first memories were occupied by ugly and scrutinizing faces of the first shipboard generation looking down at him, muttering among themselves. Testing him, doubting him, and then choosing him. Concluding that he would grow into the man capable of creating a thick and permanent planetary atmosphere. One that would fill the lungs of every colonist to come without the need for suits, for subterranean habitats. And now, an atmosphere to decelerate the resupply. Proudly billowing canopies guiding it to the surface. Lev always feared he was not that man. And he told no one. Engineers would raise concerns, he would counter with optimism. And when that failed, anger would silence them. The atmosphere was sufficient; the aerobreak would work.

And then, 72 hours later when the resupply was reduced to an incandescent orange streak tumbling and breaking apart across the sky, he screamed. But no one could hear him, because he was wearing a suit for protection from his failure. His failure that was dominated by suffocating poison while the stacks were inactive. His failure that was cold enough to blacken skin, thin enough to burst blood vessels. And so everyone else topside scrambling for cover had to wear a suit as well. Lev stood fixed as scorched pieces of resupply and ejecta impacted around him, and screamed until his faceplate was covered in spittle. His voice gave out after a minute, but he never really stopped screaming. At his miserable atmosphere, at his partner's death and her mother's silence. At Ganna leaving the habitat without her fucking suit, over and over again.

"Here," Lev spat venomously at Ganna later that evening over dinner. He slammed a charred heat shield fragment onto the table. "A little piece of home for you." Ganna's eyes locked on his, dark with something worse than hatred. There was nothing there for him. Gently, lovingly, she placed the small piece of heat shield in her lap, and resumed eating.

She will die of old age under these domes. The thought made Lev want to cry, and to his astonishment, a rouge tear did squeeze out of a decrepit duct. At the same time, for the first time, he felt his hands itch to grab, to shake, to hurt in ways he was all too familiar with when he was her size. And then he came to, realizing what Ganna would see if she looked up in that moment. Fists clenched, tear-tracked cheeks, his wretched ineptitude exposed to the circulating habitat air like a tender nerve. He stood up fast, the seat back still clattering against the floor as he stormed away.

Ganna didn't bother watching him go. She was scrutinizing the wall planner - he was due to tend the stacks in 16 hours. Her skin prickled in anticipation for warm air rushing over the topside hatch, over her skin. For glimpses of Sol beyond the gaps. Perhaps she would take the heat shield fragment with her. Running a finger over its battered surface she whispered to it, tenderly.

"Welcome to Proxi."

#

Ganna held a waterlogged sponge at the ready.

"Lift your other arm, Baba"

Face blank, Ganna's grandmother raised her arm, dusty eyes fixed at the wall ahead of her. Gently, Ganna pressed the sponge against her skin.

"Did I tell you," she said, rubbing softly, "I saw home again yesterday? Sol."

No response.

"Do you miss it?"

Baba's right eyebrow cocked up slightly. An involuntary spasm, barely perceptible.

"I know," Ganna said, dipping the sponge into the basin, and squeezing the excess water into the recycler. "I miss it too".

Ganna read Baba's eyelid twitch. *You miss where you've never been?* It seemed to say.

"I do," Ganna replied, looking over her shoulder. The heat shield fragment was sitting next to the towels, its blackened edges curled inward like wilted petals. It wouldn't be difficult to find space for it on her bedside shelf, next to the pictures of forests and rivers Baba gave her. Back when her eyes weren't blank but instead fixed, with awareness and warmth, on Ganna's face. Back when Ganna heard her voice.

"I want to go back." She pressed the waterlogged sponge back against the road-map of wrinkled skin. "Don't you?"

The hooked nose flared, slightly. *Even if we could go back, we wouldn't recognize what it's become*, it said.

"Better than here," Ganna glanced toward the buzzing overhead lights, the synthetic white walls pre-assembled by hands long gone. Above her head, a feeble painted attempt at blue sky, with two white clouds. "Better than him."

You hate him.

Ganna breathed deeply. Her eyelids sagged with premature weight, her face muscles stiff. She was quiet for some time, probing for the hatred within her. But there was none to be found. For the longest time, he lived within her as an abrasive indifference that simply existed. Since the failed resupply three months ago, he became a physical danger that required constant vigilance. To remain small, unnoticed, out of sight, until his rage at sloping regression lines and topside mechanical failures passed. It was increasingly in vain. She could only be so small, or remain so quiet. But his menace wasn't distinguishable from that of the world around her. From the low-pressure pockets topside that would cause her to bleed without a suit; the irradiated wash of Proxi's flare-ups that sent everyone rushing for the habitat's protective depth; the tumor she had surgically removed from her earlobe. She feared their consequences but hated none of them.

"He isn't home," she said, finally. Her brow furrowed. "I want to go home."

You would be far older than me by the time you reached Sol, if you left today.

"Maybe that would be enough."

Ganna

Ganna jumped as if struck. The voice boomed from a speaker fixed against the ceiling, obscured by a painted cloud.

You are needed topside for training.

"In a moment," Ganna said, her wide eyes fixed on the cloud. She reached for a towel and placed a hand under Baba's arm. "I need to dry-"

TOPSIDE.

Ganna flinched, dropping the towel as if it had burned her skin. It fell, limp, into the bath. She felt the convection of rage through the speakers, growing hotter without limit.

"I'm sorry," she whispered to the cloud, her breath quickening. She walked to the doorway, body awash in the pink glow of hydroponics systems that gave no warmth. Without thought, she scooped up the heat shield, and held it close to her chest. Rounding the corner, she did not see Baba, forgotten in the stale bath water, turn her head. Weathered eyes tracked Ganna as she disappeared beyond the hydroponics chamber, making her way to the topside

hatch. The limp in Ganna's stride, the rotten blossom of a bruise on the back of her neck, passed through foggy retinas. The corner of Baba's mouth twitched.

#

It was a good day. The horizon was overcome in a Rayleigh wash of red and orange, and Proxi loomed beyond. Even without the stacks running, the atmosphere was so thick that Lev was unable to make out the sun's curvature through the scattered intensity of light. He smiled and turned away from his victory, boots crunching on sterile pebbles that witnessed the same lifeless weathering for billions of years. Until him. Now, in the comparative time-span of a heartbeat, they will be pushed aside and broken down by the relentless growth of healthy vegetation. Lichens, ferns, woody plants, cloned fauna perched on branches and burrowed beneath roots. A self-sustaining biosphere, flush with negative feedback loops regulating the atmosphere without Lev's constant intervention. At this rate, Ganna's future children would walk across the surface without need for a suit in their elder years, just like his grandfather did as a child on Terra.

Lev stood before one of the habitat's solar arrays. The chirping alarm of reduced power generation had summoned him topside, muttering woes into his faceplate. How proud he was to find the source of the problem: sand-covered solar panels. Sustained wind strong enough to accumulate a thick layer of particulates on their surface in a short period of time. Problems caused by successes were the sweetest kind. He flicked the nozzle of a pressurized air hose, and sand swept off the webbed panel surfaces.

A red light winked on the visor of his helmet display: Ganna's name. She was beneath the hatch, powering up her suit. Taking her time, Lev noted, and anger started to crowd out his pleasure. It takes her all day to don the suit, but mere seconds to remove it topside while he's out tending the stacks. A stab of rage lanced through him, and he gave the hose an aggressive jerk, sending bullets of sand off the largest panel. Seeking calm, he again summoned the image of Ganna's children, their bare feet navigating gnarled roots and dark soil. But it would have been Ganna's own feet, were it not for the failed resupply. More bullets of sand.

Ganna's name turned green. Her suit was on, and receiving. She could hear his voice. Lev turned to see the topside hatch already open, a small suit-clad figure clamoring out. Ganna's eyes peered at him through her helmet faceplate.

"Close the hatch and come here," Lev said curtly, turning away from her. "I want you to learn this".

Silence as he stood expectantly, facing away from Proxi. And then through his helmet speaker he heard a tepid voice: "Hatch closed". A small shadow grew next to him, but he didn't look down.

"I am going to teach you how to monitor and maintain power supply for the habitat," Lev said. "Solar arrays today, geothermal systems tomorrow. How many solar arrays power this habitat?" He asked this with an abrupt bark, poised to seize on her wrong answer.

"Twenty seven," came her response. "Fifty six when the westward cable is finished."

Unabated, he followed up: "Why are we laying the cable westward?" Silence. He pounced.

"That's the direction facing Proxi, look," he pointed toward the intensity of light on the western horizon. "If that were Sol it would arc overhead, from east to west, over the course of the day. But Proxi doesn't move like that, its position remains fixed in the sky. Why?"

"We don't spin fast enough-" Ganna's voice began to whisper in his helmet.

"We don't spin fast enough," Lev said, talking over Ganna. He could hear her anxiety through the speaker, but pressed on. Pressed harder. "We're tidally locked. You go too far west and you'll burn, too far east and you'll freeze. Solar arrays do neither, so we place them westward with the cable connecting it back to the habitat. Higher insolation. More power. Are you listening to me?"

"...Yes."

That pause in her response. Another stab of anger.

"You need to understand, you will take my place before long." Finally, Lev turned down to look at her. "Tending the stacks, measuring the air, maintaining habitat power, everyone depending on you to do so. People who are here, people who have yet to come. Those before us who gave up everything so we may create a home here... Ganna, what are you holding?"

Her small suited arms were wrapped in a self-soothing hug, and metallic black protruded from them. Sharp edges glinted in the sunlight, and he realized.

"Drop it."

Ganna didn't move.

"Drop it!"

The heat shield fragment fell to the ground. Lev swept it aside with his foot.

“That fucking thing will cause a puncture! What am I supposed to do with you, Ganna? Soon I’ll be gone and it’ll be on you to shape our atmosphere. But I can’t even trust you with the air in your own suit!”

Rage cascaded through him, pulsed behind his eyes. Selfish, stupid, worthless. Hands crushed into gloved fists, he advanced on her right as a gap on the horizon parted the atmosphere. Light filtered through and blanketed the surrounding landscape. Lev faltered, blinking spots in Proxi’s blaze until his faceplate polarized. And when his vision cleared, there was Ganna. Crouched, her arms up in a trembling attempt to shield herself. Doing a poor job of it. The helmet was large in proportion to her small body, her hands barely reached halfway up the sides of her head. Facing away from Proxi, her faceplate had not yet polarized. Only her eyes were visible, wide and taught with terror.

#

“Describe it.”

Alla’s voice was gentle, calm. But Lev looked upon eyes wide with fear, skin stretched taught.

“You’ll feel it soon enough,” he replied softly, shifting to his side. Past their bed he could see through the small porthole window. Three orbs dominated the vast glitter of stars, two of them far in the distance, hugging to one another. The third orb, Proxi, appeared the diameter of a small coin and was increasingly painful to look at directly. “Feel it longer, even. Switching to deceleration only took about fifteen minutes, I barely got used to weightlessness before I was pushed back to the floor. But we’ll get a few weeks in orbit before descending to the surface. Weightless the entire time.”

“I’d settle for experiencing fifteen minutes,” Alla said. She rolled to her side and hugged Lev close. Thoughts of floating, spinning off the walls with every touch, gave pause to the anxiety gripping her chest. Six months until low orbit. If she was still around by then. The grip on her chest returned.

“It was wasted on me,” Lev murmured, his eyes fixed on Proxi. He resisted the urge to squint. “The other children were doing cartwheels through the air, pushing off surfaces, laughing. But I was terrified, clung to a wall the entire time.”

“No you didn’t!”

“I was seven, I don’t remember it too well.” A lie. The memory was never anything but fresh, stinging the entire time. The stale smell of the room when the air circulation temporarily stopped, the taste of bile stewing up as he felt the colony ship rotate and his feet leave the floor. Older voices – adult

voices – still ringing in his ears from not an hour prior to the deceleration switch. Words that had burrowed into him like a bad infestation, never to leave. *Candidate Selection*, and *A Great Honor*, and *Training Will Begin Immediately*. They looked down at him with calculating eyes and assigned his new surname: *Senior Terraforming Engineer*. Lev had met their gaze, grateful they did not look down further to see how badly his small legs were shaking.

“You’ll have another try in six months.” Alla watched Lev’s face, sensing growing distance as he squinted into Proxi’s light. “I just hope I’m there to watch you fly. Fly with you.”

“You will be.” Lev’s hand found Alla’s and squeezed, feeling the weakness in the grip, her once powerful mechanic hands now frail and slim. Withered, like the rest of her body, from a decades-long career working exposed beyond the colony ship’s protective hull. His grip subsided when he heard the faint sound of fidgets and coos from across the room. Alla shifted her head to look, briefly eclipsing light from Proxi.

“Look who’s awake,” Alla sighed. Lev started to get up, but she pushed him back onto the bed and rose to her feet with effort. Bed sheets slid off, revealing sunken skin over brittle ribs. Alla shuffled to the crib and lifted up a softly wriggling bundle of blankets. A small hand emerged from between the folds, reaching for her breast, but she redirected it to a bottle, murmuring gently, “Ganna love, you don’t want what’s in there.” Alla looked up to see Lev watching them, his face filled with anguish. She smiled softly.

“I never told you,” Alla said, slowly rocking Ganna. “But my last assignment outside the hull was spent fixing the laser communication array. I had complete control over it, and just past our bow I thought I could see Sol. And I had this wild urge to just use it. Who would stop me? I could send volley after volley of narrow beams back home toward any and every gravity well. Maybe it would reach someone who could respond. I swear, I was about to do it. But then I remembered the combined time for a message exchange was over eight years. Best case scenario. Far longer than the time I had left. So I relinquished control of the array.” She placed Ganna back in the crib and sat at the end of their bed, silhouetted by Proxi. “Light just doesn’t cooperate, does it? It won’t connect us with home, but given the chance it will break apart our bodies cell-by-cell.” She reached out and found Lev’s hand, gripping it this time with surprising force. “Not this time. When you get to the surface, you’re going to use it. Create a home with it. But not for the ones who tasked you with this. You’re going to do it for her.” She nodded toward the crib. “You’re going to do it for me. And if you can manage it, do it for yourself. Create something to carry your voice far.”

Alla looked into Lev's eyes with such intensity he felt a strong urge to hide his face. But he didn't. She smiled again, warmly. Much of it was a true smile. But he still saw tautness of skin, fear glistening in her eyes, as it would for the rest of her life.

Finally, Lev nodded, wholly unable to speak.

#

"Ganna."

Ganna didn't respond, only continued shielding her head, her eyes locked onto Lev like he was a wild animal.

"Come here." He bent down, gently held her by the wrists, lowered them away from her helmet and to her sides. He felt trembling through her suit. Her eyes wouldn't soften. "I'm sorry," he said. "I'm so sorry. I lost myself, I never meant to be like this." Ganna pulled her wrists back, and Lev released his hold. "Please," he said. "I won't do it anymore, I promise. We are all we have out here."

Ganna's expression behind her faceplate remained unchanged as she backed away from him. Lev watched after her, unhappy and puzzled. But then he saw her name on his helmet display, glowing red instead of green. She switched off her receiver after he had shouted at her through it. His voice wasn't reaching her. Lev felt an abrupt tug on the back of his suit. There was a simultaneous and sudden rush of air past his body, a terrible numbing cold, and his helmet speakers were overcome with the klaxon alarm signaling decompression. When he gasped, deeply, he took a concentrated pocket of untreated air outside, and immediately lost consciousness.

Moments later, he lost everything else.

Ganna looked up, wide-eyed, into Baba's face. Exposed, rapidly blackening hands dropped the jagged heat shield, torn bits of Lev's suit still caught on its sharp edges. Soapy bathwater ran down her skin and froze solid against the pebbles. Their eyes met, in the smallest space of time, and then with a heavy pent-up exhale Baba toppled onto Lev.

For a long while, Ganna remained as motionless as they did. Gaps parted and closed in the atmosphere above, glimpses of stars peering through, Sol among them. But she didn't look up. Her oxygen meter ticked downward. The power supply for her suit's heater waned. Then the distant stacks rumbled to life, and within several stretching minutes encased them in a fresh cascade of atmosphere, warm and wet. She reached up and removed her helmet with a pressurized hiss, breathing heavily as damp hair whipped wildly across her face. There was something protruding from Baba's blackened

hands. Stumbling as she fought against disassociation and fainting, Ganna approached and bent down. It was an assortment of high calorie nutrient paste tubes, designed to be integrated in their suits.

And then she saw between the gaps of hair, Baba's face grow animated by roaring wind. The stacks continued to vibrate the ground beneath her feet, pulsing in sync with Baba's mouth opening and closing. For a moment the atmosphere, light, movement, all of it seemingly connected. She felt the word more than heard it: **GO**.

Ganna grabbed the tubes and ran without stopping.

#

Two minuscule lime-green leaves protruded from rockwool substrate, bobbing slowly in the circulating habitat's air.

Cotyledons, her father had said repeatedly among her earliest memories. *Kaa-tuh-lee-dens*. The first two leaves to emerge from a germinated seedling. The first four syllables to pass from Ganna's lips. Lev's hand guided her small fingers gently over the surface of the leaves.

"You will learn all this, one day," he said, smiling down at her. "The importance of this. I will teach you. I will try to make it fun. It *can* be fun."

"Cotyledons," Ganna replied, her wide eyes taking in the reflected stretch of chlorophyll green and emitted pink of grow lights. Rows of seedlings extended across the vast subterrane, stretching all the way down to the distant bulkhead connecting the habitat's germination and hydroponic chambers. She looked down, mouth gaping slightly, considering the cotyledon's stem briefly before curling a clumsy fist around it.

"No no," Lev said, patiently. He gently pried the plant from her grasp, and pulled her back to sit fully on his lap. "You know, on the surface, we have to do everything ourselves, with the stacks. That's just how it is. Edging too close to a runaway greenhouse effect? We change stack discharge composition, reduce atmospheric opacity to infrared emission – release more heat into space. An ice-albedo feedback is on track to glaciare the day side? Increase opacity, trap more heat. There's beauty in it, the ability to condense processes into decades that would naturally take millions of years, if at all. But there's also necessity. Your mother would often say home is wherever you feel safe. This isn't home, not yet. We can't occupy our lives topside and trust it will stay habitable. But one day it will. When the resupply arrives..."

"Yes," Ganna said quietly, nodding as if she understood his words as well as she perceived their warmth. Lev plucked another piece of rockwool,

cotyledons lazily swaying, and placed it into Ganna's outstretched hands. She was gentle with it this time. "Yes," she repeated.

"On Terra, these covered the landscape, swirled on the surface of the oceans." Lev continued, running a finger over the cotyledons Ganna held. "Our photosynthetic biosphere. Using sunlight to regulate and filter the atmosphere. Forming a habitable surface long before our distant ancestors evolved. But as we spread across the stars, this process becomes flipped. Here, it's our turn to set the conditions for a biosphere to take root and thrive. And in doing so, we receive a home."

A distant bulkhead opened, and a slim shadow grew in the germination chamber. Ganna felt cold air over her skin. She shivered. The cotyledons stopped swaying.

"So," called a voice, thick and gravelly. "*This* is where you've been. What exactly are you doing, Lev? Have you seen what our planetary circulation models have been spitting out while you're fucking around down here? Are you trying to cover the habitat under a kilometer-high glacier within the next decade?" A man entered the germination chamber, immersed fully in the grow lights, and Ganna sensed Lev grow tense, stiff. The man was impossibly old, skin hanging off bones like drying laundry. But he moved with a lithe certainty, malice in his stride, blotting out seedlings in his wake.

"Gone are the days when I could dissuade your behavior through simpler means, Lev," the voice grated. "But I have other ways to make you hurt. You know this. Get back to the stacks and do right by us."

Wordless, Lev removed Ganna from his lap, and placed her on the floor. She looked up, and was frightened to see a flash of resentment in his eyes, directed at her, before turning toward his topside suit stowed in a corner. He began to put it on. As he did, the soft rhythmic beating of an alarm emanated from somewhere inside the helmet. Faint at first, but growing louder every second. Lev paid it no attention as he secured the faceplate. Then he turned, and Ganna recoiled, overcome with waves of nausea and crawling horror. A jagged gash was splitting across her father's suit, right before her eyes. Exposed skin, swollen black and blue, leered at her through the torn polymer. His eyes were bloodshot, unseeing. The alarm was growing now into a thunderous wail.

Alert alert alert. Flare-up onset detected. Seek protective shelter immediately. Alert alert alert. Flare-up onset detected. Seek...

Ganna wrenched up with a panicked gasp, awake, head colliding against the fogged up faceplate of her helmet. She scrambled up into a crouch, surrounded by a skeletal blackened husk of wreckage. It was one small part of

the extensive debris field from the incinerated resupply, stretching like a scar across the landscape.

Salvaging wreckage was her life in the months since she ran. Mixing nutrient paste with scavenged heavy water intended for surface reactors. Prying loose filters and batteries compatible with her suit's air and liquid circulation systems. She was sick, often. But alive. Trekking northward within the habitable longitudinal band Proxi begrudgingly relented. Leapfrogging across wreckage sites Sol lovingly provided. Doing so became easier after she disabled each and every bit of her suit capable of telemetry. The rovers dotting the landscape, searching for her, finally stopped. Likely presumed her dead, and now with good reason: in the back of her mind she knew, sooner or later, a flare-up would hit. This sun would try and kill her. It seemed fitting to strike in her sleep.

Ganna glared toward Proxi and her faceplate polarized. The surface of the sun was churning with equal contempt. This bit of wreckage was exposed on the lip of an ancient crater. It wouldn't protect her. Her helmet display flashed red and Ganna felt panic bubble up in her throat; a lethal rem dose was imminent. Frantically, she peered over the edge of the crater. Right there. Just over 100 meters down, what appeared to be a small cave system. Maybe. A tight opening, whatever it was. But she had no other choice. She jumped, making a hasty attempt at controlling her descent. She immediately started sliding and tumbling wildly. Her faceplate slammed several times against rocky protrusions, the helmet display remaining active through a fresh spiderweb of cracks. On it, the dosimeter output continued trending upward against the rolling backdrop of boulders and sky. Ganna landed in a heap, bruised and bloody, at the cave system's mouth. She dragged herself inside, ragged breath catching in her throat, and the alarm in her helmet diminished. Despite the narrow entryway, the interior was spacious, tall ceilings and distant walls reflecting stray fragments of dim light, the rest receding into darkness. The air beyond the cave opening danced in silence as the flare-up reached its peak. Rhythmic pulses of ionized greens and blues.

She barely missed the worst of it, but was likely doomed all the same. The metallic taste in her mouth was overpowering. There was, what, a full minute between her suit's dosimeter finally waking her up and her finding shelter? Ganna shuddered. How she wished she could remove her helmet without feeling fire in her lungs. There were times during her northward trek when the air was safe, when she removed her suit and thermal underlayer entirely and slept deeply beneath its gentle passage across her skin. But there were fewer opportunities to do so, the further she journeyed from the stacks.

Her father's stacks... She couldn't go back, she could never go back. A different reason played out in her head each time she contemplated returning.

Most people in the habitat could not be trusted. They were dangerous, so it's better out here.

And the few people who were kind to her, well, they probably think what happened was her fault. They don't want her back.

It *was* all her fault. Why did she say those things to her Baba, she never would have said those things if she knew what would happen-

Wherever you feel safe.

Ganna noticed the air had darkened, and her dosimeter was silent. Wincing, she rose to her feet, and cautiously peered around the edge of the narrow cave mouth. A brilliant flash of blue lanced into the cave, as if Proxi were lying in ambush. The dosimeter squawked and helmet display turned a blinding white. Ganna cried out and dove for cover behind the cave wall, then immediately scrambled back to her feet, enraged. Bands of light continued to flash through the narrow cave opening. Gloved hands balled into fists, she screamed at the light as hard as she could. Spittle and blood flecked onto her stuttering helmet display as she vented her fury, every foul thought burning inside her like hot coals.

Fuck Proxi.

And fuck this place too, tidally locked against a flare star, why would anyone come here-

A burst of violet surged through the cave opening, this one bright enough to throw the high ceiling and walls into sharp relief. Ganna's cracking voice faltered as she looked up. For a moment, she doubted her eyes. But then the cave was illuminated again. The exposed portion of walls were covered in sprawling veins of flaky lichens, anchored deep into the rock. On the cave floor, all around her, healthy wet mosses soaked moisture like a sponge. They had cushioned her boots without her noticing. The entire cave was alive. Finding calm, and awed into total silence, Ganna slowly leaned in to magnify the moss on her helmet display. Lazily wriggling tardigrades were clinging to the stems, eating algae.

The flare-up passed, plunging the cave back into dim light and shadows.

Glowing numbers danced across Ganna's face. Atmospheric pressure was safe, and breathable. She removed her helmet and listened to the echoing drip of water, muffled by the vegetation all around her. Thinking. And then it swam up from hazy memory. The resupply contained materials for biosphere seeding. It wasn't intended to explode in the upper atmosphere and scatter across the northern hemisphere. And yet, brewing in the shelter of cave

mouths across the surface, vegetation was absorbing Proxi's reflected light. Stitching together the sprawling debris field, like platelets closing up a wound. The stacks set the necessary conditions; the resupply wasn't a failure.

He would be pleased.

The sudden thought lingered above Ganna's head, echoing off the cave surfaces as if spoken by someone else.

"He would," she agreed aloud, her voice muffled by the surrounding blanket of mosses. Hot tears began to slip down her cheeks. Her face twitched uncontrollably until she cried in full. For her Baba, her father, the agonizing sight of their heaped bodies in front of an open topside hatch. For the dim silhouetted outline she recalled of her mother. She wept for home. Her tears added to the cave's moisture, destined to become proteins in the chloroplasts absorbing Proxi's reflected light, the roots burrowing into the cave walls.

With a final shuddering breath, Ganna slowly regained herself and stood upright. She clipped her helmet against her hip and walked out into sunlight. Clouds were churning on the hazy horizon beyond the crater's edge. Above, the blackness of space was barely perceptible beyond the scattering. Ganna glanced at the narrow cave opening. It gaped back at her, deceptively dark and sterile, like countless others scattered across the landscape.

Ganna bowed over and vomited. Burning in her throat and nostrils. Eyes stinging. It was happening quickly, the symptoms of flare-up exposure, it must have been worse than she thought. Fatigue was creeping in, and her lungs prickled with labored breathing. The air outside wasn't safe. She contemplated returning to the cave, and removing her suit and thermal underlayer entirely. Curl up onto the bed of moss, and fall asleep. Stay asleep. Give her carbon, nitrogen, phosphorus, water, all of it, to the small patch of biosphere growing inside. But in the distance, just beyond the crater's edge, another wreckage site peered at her, called wordlessly through the thin air to her. So she secured her helmet, and went.

But it wasn't wreckage.

Ganna didn't know what it was, other than being much larger than it appeared from a distance. No matter how many labored steps she took, it didn't seem to get any closer. But it did get taller as she ascended a ridge, reaching the very top. There at the bottom of a valley it stood in its entirety, far in the distance, absolutely massive: terraforming stacks. But these were new, skeletal, under construction. At its base, a framework of something else, she couldn't tell. She zoomed in on her helmet display and saw heat shields. Distant thuds and grinds of machinery were audible. She understood: a sister colony ship, from Sol. The minuscule movement of people could be seen

disassembling the ship, repurposing it into a subterranean habitat on the surface.

Ganna fell to her knees, utterly exhausted, dizzy. She removed her helmet and vomited again. Her suit was low on fluids, just like her. Batteries were burning up, shorting out. There were no more steps to take. It was impossible. The air burned her insides, ached her brain, and poisoned her blood. But the helmet was now too heavy for her trembling arms to lift and put back over her head. She was going to die here. Remorsefully, she wished she had given herself to the vegetation in the cave. But then the crumbling of rover wheels approached from behind, and remorse immediately turned to fear. Did a search party from the habitat manage to find her without telemetry? She was in no position to resist, and would be handled roughly. They would surely take her back, nurse her to just enough health that she could be forced back into the terraforming project, until she was utterly spent.

It wasn't them. It wasn't anyone she recognized. The technology of the rover looked different, alien. So did the suits of the two people climbing out, full faces visible through their faceplates, overcome with concern. They crouched over her. One of them picked up her helmet, examining it briefly with fascination before placing it gently over her head and securing it to her suit. Over an open channel, a flood of words issued through her helmet speakers, into Ganna's ears. She understood none of them. It was a different language entirely. Everything was impossible to comprehend. These were new colonists. They arrived here, and she had no idea, none of them did. There was no mention of this from her father, from anyone. She looked up at the taller one, through his faceplate, and saw kindness in his eyes.

"Sol?" she asked into her mic, feebly.

The tall one nodded. Exaggerated up and down motions, to ensure Ganna could see.

"Terra?" she ventured further, excitement rising. She tried getting to her feet, but faltered. "Are you from Terra?" The two colonists looked at each other, their faces bewildered. They must have switched to a private channel, Ganna could see their mouths moving rapidly, but her helmet speakers were silent. The tall one switched back to the open channel, and placed a hand onto her shoulder.

In the years that followed, when Ganna became well versed in their language, the tall one, Dai, would tell what they knew. Of societal upheaval on Terra that must have erased records of the first colony ship to Proxi. The flashes on the planet's surface a century before, visible from their Martian cities, and even some Jovian moons. Then an unbroken silence and ruinous

glow that never went away. But for now, Dai could only muster a variation of three words in Ganna's language.

"Home gone. Your home. Gone."

#

Rusty white was the color of topside, for as long as Ganna could remember. White quartz from the primordial beginning, when the newborn surface was glowing hot, accreting under fiery bombardment. And then, a gentle blue, after everything calmed enough for liquid water. But Proxi dominated the sky, and the surface wasn't yet tidally locked. All of the water's hydrogen burned off into space, leaving the oxygen behind – heavier, highly reactive, and alone. Forced to find another home with whatever else would take it. The carbon in the air, the iron in the rocks. If oxygen could choose, perhaps it would still be with the hydrogen, wanting to be water. But elements only react. And so: rusty white, under poisoned air.

Ganna squinted. When she did, small dots of green became visible, mixed in with the rust. Uneven across the vast stretch of valley, patchy like beard stubble. It looked this way through every window on the habitat's topside observation deck, including the largest one facing east. But Ganna avoided looking through that window if she could help it. Instead she sat on one of the benches built into the smaller west facing alcove, her back resting against the transparent walls, holding her knees loosely to her chest. She watched feeble wisps of cloud drift out from under the ridge line shadow, and burn away in Proxi's light.

It had been 18 months of reclusiveness, and distrust. Surrounded by spoken language of the new colonists, one she had no interest in learning. But she learned. There was a pit inside her extending to aching depths when she used their words, imitated their mannerisms. At the bottom she felt trapped, looking up at a single dot of light, shimmering like a distant star.

Like Sol.

But Sol didn't remember her. It sent other children to Proxi without even realizing she was here. Those days spent topside, no suit, searching for the faint yellow between gaps of rushing atmosphere. The whole time there was nothing looking back, nothing searching for her. She should have known. Light from stars radiate indifferently in all directions. An infinitesimal fraction of Sol's light reaching her on accident, the rest lost to blackness. Ganna started speaking more when she realized this. There was a deliberate roughness in the use of her new language, like tearing at old skin that no longer fit. But this caught the attention of Dai, his concerned face wincing at

Ganna's harsh consonants. *You must speak your language or you will forget it entirely*, he said. So they spoke every day. In groups, Ganna used their language. Alone, Dai and Ganna conversed in hers. Dai improved quickly. He pronounced her words with delicate care. Ganna started doing the same with his.

But Dai hadn't been here for long. She knew, at some point, Proxi's light would break down the kindness in his eyes. Like her father. She chose her words carefully.

The subterranean hatch at the center of the observation deck's floor opened.

"I wasn't expecting to see you up here."

Ganna looked over to see Dai's head poking through. He reached an arm through to brush jet black hair from his eyes, which were wide with a joyful glint. She looked back to the valley.

"I'm always up here."

"Yeah, but today..." Dai's voice trailed off and he glanced toward the eastern observation window. "Well hey, I'm happy to see you." He gripped the handles on the hatchway and hoisted himself fully onto the deck.

"Thanks."

Dai walked toward the alcove where Ganna sat, but stopped just short of it. He squinted as he took in the valley. "Oh yeah," he said, a cautious smile on his face. "Definitely more green since last I checked."

"Not much."

"But more." Dai persisted, grinning. "Vegetation moves at its own pace. A much faster pace after today, if all goes well. The surface will look a lot better."

"Sure."

Hearing the silence, Ganna looked over to Dai. He gestured to the bench across her. She shrugged. Her gaze returned to the valley.

"You think the test is going to fail, don't you?" Dai sat down with a comfortable slouch. He cast a nervous glance again toward the eastern window. Through it, on the other side of the valley, a massive discharge port stood at the base of the newly completed stacks. Gaping like a vast expressionless mouth. The stacks towered overhead, dominating half of the deck's skylight. This never presented a problem for Ganna; she didn't look up much anymore.

"No," she replied flatly. "the test will go better than you realize."

"Yeah?" His voice was full of encouragement. But it was for her. Interest in what she knew, what she was thinking.

Ganna sighed and sat up a little straighter, looking at Dai. “Your colony ship took what, half a century to get here? A little less?”

Dai gave a small nod.

Ganna finally turned toward the eastern window. The stacks stared down at her through the skylight, like a stoic colossus. “Our transit took three times as long,” she said, looking up at them. “That’s quite the reactor pushing you across the void, and now you’re using it to power your stacks, just like we did with ours. In one year the carbon sequestration and oxygen production alone will outpace the past decade of our own efforts. The biosphere will eat everything you throw at it, will spread beyond the reach of the stacks, until it can exist without human intervention. Pulling carbon out of the air, replacing it with oxygen to breathe, autonomous in response to external pressures and shocks. So yeah,” Ganna looked away from the stacks, toward Dai. “Today will exceed your expectations. And the day after that.”

Dai leaned back against the bench, a smile on his face. “Now that is good to hear,” he said, closing his eyes. “Why didn’t you mention anything earlier? I would have slept better.”

“I assumed your engineers told you as much.”

“They’re saying it’s a coin flip. Some think the discharge rate won’t overcome the planet’s negative feedbacks.”

Ganna suppressed a snort. “They’re new here. The coming success is out of their hands at this point.”

There was a twist of bitterness in her voice. It was not lost on Dai. A small, knowing smile slowly spread.

“Perhaps it can fall into yours,” he said. He wasn’t seeking an answer in saying this. Instead he just watched her, still smiling, continuing to lean against the glass walls of the alcove. “You couldn’t imagine the surprise on approach,” he continued, “when we were close enough to resolve Proxima’s light passing through the atmosphere. There were spectral signatures of biotic compounds, and we wondered: *alien life*? No. Instead we found a young girl from a forgotten maiden voyage, dying of radiation sickness. It was a challenge, restoring your health. Undoing the damage. And once you were able to talk again, and the first thing you said was ‘don’t send me back’.” Dai leaned forward now, his eyes on Ganna. “I wondered if that’s all you would say. But then we started talking. And when I mentioned terraforming, you just went off. Your knowledge was overflowing, it was stunning. I figured you’d want nothing more than to join our mission. Of course I knew I figured wrong, when I first asked you. Maybe you needed more time.”

Ganna said nothing. She knew this talk would come. The things Dai wanted from her. The rest of the colonist, too. Why else give her a room, a bed,

clean air, clothes, medicine? And how did they plan to force her, when she refused?

She had no intention of finding out.

Unknown to anyone, a spare topside suit was stowed under her bed. Next to a duffel bag full of stolen supplies from food storage and engineering bays. She knew of a rover parked in the depot that would start without an ignition code, its cabin shielded from flare-ups. There was a well-rehearsed, second-by-second plan, ready the moment it became dangerous. She even acted on it a few times, spurred by the jolt of an offhand comment or poorly timed look in her direction. And then she was hyperventilating into her helmet, vision blurring at the edges, stumbling down subterranean hallways to the nearest topside airlock while everyone slept. Last time, she almost did it. The airlock was depressurized, duffel bag slung over her back, gloved hand resting on the release lever to the topside hatch. But her heart finally steadied, and her breathing slowed. She found calm. But it was never guaranteed. Eventually, she will pull the lever. And then she will be gone.

Ganna still said nothing. Dai did not break the silence. Then finally, she inhaled softly, hesitantly. "I hear the others talking," she said, choosing her words carefully. Keeping her voice neutral. "They've been asking me more questions, wanting more assistance. They're trying to put me on the terraforming mission."

"That's not their call," Dai said, simply.

"I see," Ganna said to Dai. With effort, her voice remained steady. But her mind gravitated toward another anxious inventory. The suit and duffel bag were under her bed. The rover with the chipped red paint started without an ignition code. She forced these thoughts aside. "It's yours then, is that it? You'll decide when I join the terraforming mission?"

Dai shook his head. "It's your call, actually," he said, relaxed, looking back out at the stretching landscape, the feeble green. "But no matter what you choose, you will always have a home here."

Ganna said nothing. But slowly, quietly, a breath she didn't realize was held released. Dai didn't seem to notice, keeping his gaze through the western alcove window. His face was full of Proxi's light, but he hardly blinked. Ganna considered her hands, holding her knees to her chest. She relaxed them and sat cross-legged, back against the alcove, as Dai did.

"That being said," Dai continued, "your work in the hydroponics bay has been fantastic. I wouldn't complain if you chose to keep that up. Half the reason I came up here was to keep myself from gorging on radishes... Oh, hello." The center hatch had opened. Colonists were hoisting themselves inside, filling up the observation deck, chattering animatedly. Dai turned back

to Ganna and smiled, rising to his feet. “The test is about to start, Ganna. Come on, let’s grab a good view.”

Ganna hesitated, but then followed. Among the sea of colonists, faces turned her way, and she braced for glares of expectation and resentment. Instead there was giddy excitement, it carried through the observation deck like a thick charge. Smiles grew at the sight of her, they shuffled to make room for her in the crowd. On the window’s display, a timer appeared, counting downward. The crowd started counting with it, in jumbled unison. But still, Ganna couldn’t bring herself to join in. She found herself wishing the timer was set for a little longer.

The mouth of the stacks disappeared in a shimmering blur. The windows of the observation deck shuddered, and the blur turned into an opaque cloud mushrooming out in every direction, covering the landscape of rust and white and feeble green, rapidly approaching the windows. Within minutes, a cascading rush of warm, damp atmosphere hit the thick glass with relentless speed and careened up, enveloping the entire deck before continuing on behind them. There was an immediate explosion of joy. The kinetic energy of it jostled Ganna in every direction. Observers were crying out, hugging onto each other, laughing. Some of the older colonists wept. The windows were dripping with condensation. Barometric and chemical data scrolled across, prompting another round of cheering. People spoke buoyantly of revised habitability timetables. Dai’s face was full of tears. Unable to contain himself, he scooped Ganna up into a tight hug, laughing words that were lost in the jubilation around them. Ganna realized she was smiling.

And then a year passed.

Ganna had made it a daily ritual to take long walks in the valley after she completed her work in the hydroponics bay. When the stacks were active, she went without a suit. This made the other colonists nervous, but no one ever attempted to prevent her. She would pause from time to time during these walks, and stand in the silence of a landscape animated with change. It was increasingly vegetated. Brave stems ventured far from growing pools of water, relying on precipitation and condensation for nourishment. They put down roots with confidence it would come. And then gradually, naturally, Ganna’s thoughts shifted to terraforming. As she wandered the valley she sensed the surrounding biogeochemical cycles, exponentially catalyzed by the stacks. There was a feeling of heightened autonomy in the biosphere. She suspected photosynthesis and aerobic respiration increasingly accounted for the uptake and release of carbon all around her. There was comfort in the thought.

During one walk, Ganna reached the top of the valley where the air grew slightly thinner. Dai was standing in the distance, next to a parked rover. He was hunched over the base of a recently erected metallic structure. Others just like it were scattered throughout the valley. Dai stood upright when he saw her. He removed his helmet, brushing black hair from his eyes.

“What are you up to, Dai?” Ganna called, warmly, when she was close enough.

“Hey Ganna. Just failing miserably at calibrating the flux towers.” Dai called back. His eyes were full of frustration, but Ganna was unbothered as she walked up to him. Dai was laughing at himself, his gloved fingers punching another command into the terminal at the base of the tower. The screen flashed red. His laugh transitioned seamlessly into a groan. “We can’t automate stack discharge until it’s figured out. I’ll be out here for a while.”

“How about I take a look?”

Dai startled, and his eyes were wide with pleasant surprise. He stepped aside wordlessly. Ganna tied her hair back to clear her face, and leaned in to the terminal. Her eyes glowed in the screen light as she examined the outputs for several minutes. Then, bare hands tapped out commands. The screen flashed red several times. But on the fifth try, it flashed green. Dai looked from the terminal output to Ganna, and grinned. Ganna grinned back.

#

The twilight zone of the habitable band was sacred space. Color worked differently. Proxi was nothing more than a rippling thread of deep red light on the horizon, and stars gleamed brightly between the overhead clouds in its absence. The faint song of persistent easterly wind carried across the surface, through clustered vegetation and steam rising from geothermal springs, vibrating and echoing as if a living cathedral was not far off in the distance.

Ganna switched off the rover’s headlights, and sat motionless in the dim light of perpetual sunset. Her breathing was slow. It was accompanied by another, smaller. She looked down to the copilot seat. A child’s eyes were alight in the ruby glow of reflected light. His small features were familiar, a genetic mix of dozens of colonists. Ganna saw her own features there, and by extension that of her own family. Under Proxi’s light, the elements swirled with perpetual change in self-sustaining cycles. And so too did the genetic legacies of the colonists. Measured carefully, so the colony’s planetside generations of children could call every founding colonist a parent. Though she never volunteered for the role of surrogate, this was Ganna’s child.

“Yuki,” Ganna said, quietly. The small face turned. “Want to take a look?”

Yuki smiled broadly. Without another word, he swung the door outward and was gone with a scamper of small feet. Ganna ducked her head followed him. Their suits stayed behind. They had become an afterthought in the two decades since the Martian colony’s stacks were first tested. When she fully emerged from the rover, she was surprised to see how far Yuki’s little legs had carried him. He was shimmering in the distance against the band of Proxi’s dwindled light. Almost beyond her sight. Cupping hands to her face, Ganna called out.

“*Yuki!*”

Her voice carried far, pushed by the currents of easterly wind. It was strong, sustained, and Ganna felt like it continued on over the horizon before them, racing into sunlight. Yuki turned back, and Ganna waited. She listened to the stirring of woody vegetation. The hum of insects. Yuki stomped up and flopped onto his back at her feet, panting.

“Harder to breathe this far from the stacks, right?”

“Yes,” Yuki gasped.

“Take your time,” Ganna said, sitting down beside him. The ground was soft, cushioned by a bed of grasses. “We will start when you’re ready.”

Half a minute passed. Then Yuki said, “Okay.”

“I want you to find our neighbors,” Ganna whispered, leaning close to him as she looked up. “Tell me their names, and how far they are.”

Yuki scrutinized the night sky, turning his head slowly from side to side to take it all in. Then, he pointed at the brightest of the stars, two of them, bound closely to their barycenter.

“The sisters,” he said.

“Yes, but what are their actual names?”

Yuki thought for a moment. “Alpha Centauri A, B... part of our system, not far away.”

“Keep going,” Ganna said, leaning back. “Be specific.”

Yuki pointed west. “Sirius... Twelve light years.”

“Well done,” Ganna murmured. “That light is almost twice as old as you, Yuki.”

He continued on like this, and Ganna listened. Barnard’s Star. Procyon. Tau Ceti. And then, finally, Yuki gestured toward the horizon, “Sol, right over there. Four light years.”

“There it is,” Ganna said, looking over to where Yuki was pointing.

“More like four and a quarter.”

“That was home,” Yuki continued, keeping his gaze towards Sol. “But then you made one here.”

“It wasn’t just me,” Ganna replied. Her eyes remained fixed on Sol as well.

“They’re naming parts of the town after you like it was.”

Ganna laughed and sat up slightly, propped on her elbows. “That’s because I helped us breathe a little better,” she said. “Protected us from Proxi’s light a little more. Do you think that’s all home is?”

“I don’t know,” Yuki said. His forehead creased. Ganna remained silent, letting his thoughts play out. “Can’t have a home without that, I guess.”

They were quiet for some time. The grass around them rustled with easterly wind. Just over their feet, something could be seen darting between the bushes. It was small and covered in fur. Ganna listened to all of it, animated by the atmosphere around them. The heat it trapped and released. The biological processes it sustained. The way it gently fluttered over her skin as it rushed westward into sunlight. Warming, rising, traveling eastward to the night side, cooling, sinking, traveling westward again. Perpetually. Her eyes drifted from Sol to the horizon, toward Proxi’s light. Ganna thought of Dai’s grinning face in front of an observation deck window dotted with condensation. The faces of the other Martian colonists smiling at the sight of her, parting to make room for her. Distant recollections of Alla’s body, leaning over her own. Lev before his eyes diminished in their kindness, holding Ganna close in the germination chamber. And Baba’s voice whispering in the darkness of a sleeping habitat, her words painting vivid images of mighty Eurasian rivers draining into the Arctic Ocean on Terra.

“It wasn’t just me,” Ganna said again, softer this time. She looked beside her. Yuki had fallen asleep in the bed of grasses. His chest was rising and falling slowly with the stirring vegetation around them. He slept like this in the rover, rocking gently with the terrain as Ganna drove them into the gradually brightening horizon.

Within hours, the stacks came into view, and then the town at the bottom of the valley. Cultivated fields extended outward in all directions. The edges were ringed by sprawling arrays of wind turbines, their heavy blades spinning with the powerful passage of air. Dark rainclouds were roiling in the distance. It was raining in full by the time Ganna pulled up to the central courtyard. Everyone was outside, chasing one another, dancing in the downpour, splashing in puddles. They had no suits. Most had no clothes on at all. Joyous voices stirred Yuki awake. He jumped from the rover while it was still moving, and sped off to join the crowd, shedding clothes as he ran. A modest flare-up was unfolding on Proxi, but there was little danger anymore;

auroras slowly heaved beyond the storm. Ganna stood by the parked rover and watched as Yuki was picked up and spun by his surrogate mother. Dai was beside them. He smiled towards Ganna, white hair plastered flat over his forehead, and she smiled back.

Between the parting clouds, Ganna could see Sol. It was positioned just right in their 11-day orbit around Proxi for them to appear side by side. A kaleidoscope of colorful tendrils extended from the two stars, pulsing on the surface, caressing the town, the biosphere dancing in puddles, the muddy lithosphere beneath her bare feet. The water and air all around. Sensing their warmth, she closed her eyes and let the propagated waves of light encase her like they were countless reaching arms. For a moment, she felt with a glowing certainty that she could touch them, feel them.

And then reaching up, Ganna held them lovingly, against her face.

ABOUT THE AUTHOR

David Jensen is a geospatial / remote sensing scientist with a research background in cryospheric and climate science. He enjoys photography, oil pastels, cycling, and gardening. He designed and built a hydroponics system, and uses it to grow basil in his basement for homemade pesto. He is extremely smug about this.