

Beneath the Surface, a Womb of Ice

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“The point of Mars,” Serafina said over the radio as her rover crunched over the fine lacustrine surface of the Argyre Planitia, “is that it’s the opposite of a safe place. Why else would we be here, except to challenge ourselves, to challenge humanity?”

This was the first salvo in a well-worn argument, the kind of thing the four scientists debated to keep themselves awake and alert as their twin vehicles traversed the southern regions of Mars.

For Serafina, the landscape perennially looked the same—boulder, scree, ejecta, boulder, scree, ejecta. For geologists like her husband, Tahar, it might be a wonderland, but for her, only the map markers on the screen in front of her allowed her to sense any kind of progress in their quest to find Mars’ hidden water.

The rugged, angular vehicles had few windows, to keep heat in and radiation out, and looked a bit like old-fashioned RVs with tank treads—a necessity, given that they might be out for weeks in the field. Like spaceships, they were miniature worlds, with individual septic systems and carbon filtration to minimize the risk of contaminating the Martian surface with Terran bacteria. Though, given the colony’s presence, there were those who would argue that that particular cat was out of the bag. That change was, in fact, inevitable. That they’d brought it with them.

That even the act of observing changes the observed.

For Serafina, perched in the pilot’s seat, the surface of Mars looked at if it hadn’t changed for all of eternity. She could see the towering escarpments of the impact crater that had carved out this red-stained, low-lying basin.

Tahar stabbed a finger toward the cutoff horizon at a tumble of boulders below the rim. “Look! Imagine the force of the water that would have taken them from the cliff’s edge! I think those must have been moved during the initial outbreak event, when the waterfalls themselves were born.”

“Do they look eroded to you?”

“Too far to tell yet. Would love to get outside the rover and have a look. But . . . maybe next

trip.”

They exchanged a look. The chances of getting this far from the main colonial base in Cydonia again in the next M-year seemed slim.

Everything on Mars required risk. Managing risk required redundancy—two teams for their expedition. Two rovers, so that if one failed, both teams could still evacuate. Two sets of gear for each person when they found a likely set of caves. Two methods for sanitizing their gear, lest they leave the bacteria of Earth in places where Martian life might thrive, hidden beneath the surface.

Redundancy upon redundancy upon redundancy.

Static crackled on the radio, and then she heard Elimu Nyondo's voice, rich with his South African accent, replying to her previous salvo: “There are those who would say that no place has an obligation to humanity.”

“Quite the reverse,” added Pema Dawa's precise, measured voice, also from the other rover. Half-Tibetan, half-Nepalese, she was an expert mountain climber and caver, and possessed the EPAS1 genetic mutation that had allowed her ancestors to endure the altitude of the Himalayas. “It is we who have an obligation to the world around us.”

Serafina smiled faintly as Tahar, recalled from his rapturous observation of the red world outside the rover, shook his head and replied, “We have an obligation to this world, yes. Not to change it too much. But think of the changes this world makes in us, as we walk across its face, discovering it. Learning it. Understanding it.”

Serafina squelched their transmission. “You romantic,” she teased out loud.

Then, back to work. She diverted around the worst of the boulders and finally found what satellite mapping had suggested might be the gentlest incline in their potential exit to the southeast.

So close to the south polar regions in summer, the sun wouldn't set for months, so they had to rely on clocks to tell them when to eat—or when the voice of Control, far to the north at the Cydonia base, reminded them to take breaks. As it did now, in the person of Rada Morozova. “Exploration Team, this is Cydonia Base with your four-hour check-in. Take a break before trying the ascent. You need to be sharp going up that incline. Have dinner, and then switch drivers and move on at your discretion, one vehicle at a time.”

Redundancy. Caution. Because Mars was the opposite of a safe place.

Serafina found a relatively flat place, and the other rover pulled up alongside them. “Send out the umbilical,” she called over the radio. And moments later, she felt the light *thunk* as the second rover made contact with theirs. The main hatches on these lumbering vehicles were true airlocks to prevent the loss of valuable oxygen from the interiors into the low-pressure Martian atmosphere, and again, to reduce contamination of the Martian surface.

Sometimes, Serafina felt impatience with the strictures of their lives here. *Change is inevitable. That's evolution. Those of us who have children here . . . those children will adapt, generation by generation, to the gravity. We'll all still be living underground, in pressurized tunnels, of course, but they'll be a part of this world in the way that we of the first generation aren't.*

Children. Serafina tried not to think about that. She and Tahar had done the smart thing, the rational thing, before leaving Earth. The radiation of the journey, the radiation on the surface. . . it had seemed too dangerous to any children. So they'd banked sperm and ova, and she'd had a tubal ligation performed.

But that didn't mean that she didn't feel a pang whenever she watched Pema and Elimu lightly, delicately flirting. Two young people just entering into the beginning of a relationship, where all possibilities lay before them, in superposition, hovering over the present. Including children, *in potentia*. Futures yet unseen.

The hatches whirred, and two suited figures appeared, helmets off, carrying wrapped MREs. “It's our turn to visit you,” Pema said cheerfully, taking a seat on one of the tiny benches in the kitchen area.

So necessary, the rituals of human life. Breaks in their mutual isolation helped regulate their

psyches, even their hormone levels. Serafina laughed as Pema offered everyone a bottle of *sepen*, a hot sauce she'd brought as one of her comfort items from Earth. "Just a drop will liven up these terrible meals," the other woman promised.

"I don't want to clog the septic system in an hour," Tahar refused, raising a hand as he heated his meal and Serafina's. His comfort items had included a set of Moroccan spices, which he added subtly to prefab bricks of macaroni and cheese.

Serafina inhaled the aroma of ginger, coriander, and clove, feeling the stress of the painstaking hours of driving fell away. "Proust had his madeleines," she said, stirring the noodles. "And there's plenty of evidence that smell connects deeply to memory. To making new memories, folks." She raised her collapsible cup, filled with water recycled and filtered through the vehicle's reclamation system.

"New memories!" Elimu clinked her cup with his own. "Now, about the incline ahead of us . . ."

Pema poked his suited arm with her chopsticks. "No work-talk till we're done eating. That's the rule."

"Ow." He pretended to rub his arm. "She's brutal, everyone. You have no idea of the abuse I endure in the other rover."

Quiet laughter, comfortable conversation until the meal was done. And then, back to work.

* * *

Four channels had been water-carved into the edges of the Argyre back in the Noachian period 3.7 to 4 billion years ago—or just shortly before the earliest noncontroversial signs of life on Earth had formed. Three had entered—Surius Valles, Dzigai Valles, and Palacopas Valles. One had exited—the Uzboi.

The Dzigai, as far as planetary geologists and hydrology experts had been able to determine, had had its source closest to the southern polar regions. And the entire fluvial system, from its theoretical source in the Dzigai to the Argyre lake basin, and from there through the Uzboi river that had emptied it, stretched nearly eight thousand kilometers. "Longer than the Nile," Tahar commented, sounding oddly content as he took a turn at the rover's wheel, pressing up the thirty-degree incline. "I can see it in my mind's eye. Like kayaking along the Colorado River, except with a terrifying drop over the cataract of the falls. And then a plunge into a sea the size of the Mediterranean."

Serafina's palms felt damp inside her gloves. She hated being out of control, but they needed the least-tired drivers to handle this stretch. "Following the ghost of water to find its grave," she commented tightly, looking out the small side window. "Careful. The edge drops away on the right."

"I see it." Tahar smiled, a quick flash of white teeth. "And no, not its ghost. We're following its tracks back to where it's waiting to be born."

"Every Frenchman is a poet, waiting to be discovered."

A rueful laugh. "There were plenty of people where I grew up who thought that having an Algerian mother made me not nearly French enough—"

The rover dipped and swayed, and Serafina grabbed for a handle overhead as Tahar swore, hitting the brakes. They hadn't been going more than ten kilometers an hour—less, probably—but now the whole vehicle listed to the right.

The radio crackled to life. "Rover One, are you all right?" Elimu's voice came through. "You're looking a little crooked up there."

Serafina's eyes latched onto the lip of the embankment uphill of them. "We're not wobbling, at least," she replied after a moment, clicking the radio on. "Tahar, you want me to hop out and take a look at the situation?"

He nodded tautly. "Yes. Outside cameras aren't giving me a good view of where the treads are resting."

She cautiously made her way to the airlock, where the oxygen bottles were kept. Her nerves jangled with each step, fearing that changing the weight distribution would send the vehicle sliding further. *Relax. You hardly weigh here what you did on Earth. Just be careful.*

Stepping out the airlock, she found that there was a sharp drop to a boulder alongside the pitch they'd been climbing. "It's not too bad, I think," she called into the radio. "Just a little over the edge. I think the right-side camera is buried in fines." The dust of Mars could get surprisingly deep in areas and was the bane of every mechanical device humanity had brought to the red planet.

"Is the tread all the way over the edge?"

She clambered up for a better view, staying well away from the rover itself, and trained her helmet camera on the rover from the front. "Looks like it at the front."

The radio crackled, and Pema's voice came through. "Cydonia is suggesting that we could come up from behind and give you a gentle push."

"Negative," Tahar replied immediately. "If the first rover slides down onto you, we have two vehicles out of commission. It looks like the rear part of the tread is still close to the edge. I can try to back up."

"The edge looks crumbly," Serafina warned. "We might want to put something down for . . . added traction? Stability?"

"Not crazy about you getting too close to the treads when I'm trying to move this beast," Tahar replied tightly.

It took two precious hours. In the end, they simply got lucky, and Tahar was able to right the vehicle, after several failed attempts, but without needing a push from Pema and Elimu.

So simply reaching the top felt like summiting Everest. But once they crested the top, and Serafina took her first full breath in what felt like an hour, she took a moment to look around. "No mountains," she remarked, obscurely disappointed to have fought their way uphill from one flat plain, only to find themselves on another, identical plane. "I don't know why I expected to see any."

Tahar pointed to her right. "That smudge on the horizon is probably the Charitum Montes," he told her, taking off his gloves to let the sweat-soaked inserts dry as they waited for the second rover to repeat their climb.

"Really?" Serafina squinted. "I shouldn't be this excited at the thought—"

"Or it could be a dust storm, and we'll have to take a broom to the solar panels on the roof after it hits us," he admitted, and she planted an elbow in his ribs. "Call Cydonia and let them know we made it topside, eh?"

* * *

Farther and farther southeast they wended, following the ancient riverbed. When they reached Maraldi Crater, they paused, and Elimu exited the second rover, fully suited, to set up his drones for their surveys. The black graphite rudders shuddered to life, and they took off like a cloud of angry bees. "If there are any caverns in the crater walls, we'll find them," he promised, heading back into the protective shelter of the rover to direct the drones and their camera eyes.

"If we find caverns here, they won't be the type we need," Serafina muttered. "Too shallow, right? Just bubbles carved out of the edges while the rock was molten after impact."

"Every piece of data we collect is new information," Tahar reminded her. "Every bit of it has value."

"I know, I know." She gave him a lopsided smile. "I'm a biochemist. I feel as useful as a cat on roller skates right now."

"If we find a cavern system deep enough, with access to an aquifer, you won't feel useless anymore."

She closed her eyes. That was the hope. The *dream*, really—it was too thin a possibility to quantify as a hope. If they could find a deep enough cavern system, if it had been volcanic in origin, if the iron core of Mars still held enough heat to keep underground water stores liquid and flowing, if, if, *if* . . . then they could follow that water, looking for life. Without having to venture onto the carbon dioxide cap over the water-ice of the southern polar regions and then attempt to drill through dry ice, regular ice, and rock to find the ocean that radar observations hinted might exist beneath the surface.

The cold of the poles was dangerous. The potential for contaminating a pristine environment with Terran bacteria on their drilling equipment? Just as bad. So their cave-seeking expedition had been evaluated and deemed worth pursuing.

After hours of watching drone footage, pushing the limits of their five-kilometer range, Tahar clicked the radio on. “Elimu, I think we need to move on.”

“Agreed,” Pema replied on the same band. “The volcanic tunnels will be further to the south, deeper in the Oceanidum Fossa.”

“Just earning my keep,” Elimu replied cheerfully. “Say, Dr. Belmadi—”

“Which one?” Tahar asked as they got the rovers moving again.

“Your wife,” Elimu replied with a chuckle. “What do you think life would look like here? I climbed Mount Kilimanjaro when I was young. I was inspired by Sibusiso Vilane, you know. But as we made our way up, we went through ecosystem after ecosystem. Rainforest at one altitude, heaths above that, and above that . . . I felt like I’d found myself on another planet. The trees at altitude, the giant groundsls—they look like giant candelabras the size of telephone poles. They don’t spread out branches, really, either.” Awe in his voice. “They’re like nothing else on Earth. How different would life be *here*, if we can find something that alien on our own world? My background’s in engineering. They just sent me along to run the drones and help with any climbing we might do. So I’m trying to picture life that doesn’t look like life, and failing.”

“You might not be a scientist, but you’ve played catchup very well.” No disguising the affection in Pema’s voice.

Serafina cleared her throat after a moment. “Well. Life. That’s the million-dollar question, isn’t it?” she replied, watching boulders crawl past. “No one knows. But I like to think that the Universe behaves in regular patterns. And that if life, by whatever process, began here, it would respond to pressures and stresses that life on Earth has to—by adapting. Now, what that life would wind up looking like? I have no idea. And I want to keep my mind empty, devoid of preconceptions, so that I’ll have a better chance of knowing it when I see it.” She paused. “Well. *If* I see it, anyway.”

A pause. “Do you think we’ll ruin it?” Elimu asked, his voice graver than she’d ever heard it. “All our precautions. All our care not to intrude too much. Will we just kill it?”

Serafina stared at the blank, indifferent landscape around her. She understood the attitude of the preservationists back at Cydonia, an attitude adapted from that of nature conservationists and indeed, even hunters back home. Go out into the wild and return, leaving nothing but footprints. And yet . . . “I don’t think *ruin* is the right word,” she replied as gently as she could. “Everything changes. Everything adapts. If you don’t change, if you don’t adapt, you die. That’s . . . sort of the lesson of the Universe, as far as I’m concerned.”

“That’s not really an answer,” Pema pointed out.

“It’s the only one I have,” Serafina replied, shrugging, though they couldn’t see her.

* * *

Finally, at the southern end of the Doanus Vallis, they found it. A range of rough hills, southwest of two huge craters, that hadn’t been impacted by the intrusion of asteroids into the crust. Where there were, indeed, signs of volcanic tubes.

“This is where it gets interesting,” Tahar said jubilantly. “Elimu, send out your drones.”

“Once they get inside the caves, radio contact will drop almost immediately. The more iron content in that rock, the faster I’ll lose touch.”

“Understood. Just get us a feel for what we’re potentially getting ourselves into.” Tahar grinned at Serafina, as excited as a child, no matter the gray that sprinkled his dark hair. “No sense getting worked up if the tubes are collapsed, eh?”

* * *

The tubes weren’t plugged. Serafina felt adrenaline precursors flickering in her veins as she stared at the drone footage on her screen.

The entry tunnel, an irregular opening in the ground through which their rover might have fallen, was decently sized, about 2.5 meters by three meters. After an initial descent of about three

meters, the tube widened into a large bubble, before another apparent drop into the depths. “Well. That’s a wider opening than some of the caves I’ve climbed in back on Earth. Let’s let Cydonia know,” Serafina assessed.

But her mouth felt dry. She’d always gone into caves with experienced teams who knew the cave system intimately before. Here, they’d be mapping as they went, LIDAR bouncing off the walls and generating computer-drawn models of the area around them. They’d be running on tanks of nitro-oxygen and rebreathers, like scuba divers, though without the risk of nitrogen narcosis or the bends. At best, they’d be able to go two hours at a time before having to turn around and come back, though they could pre-stage oxygen tanks along safe routes as they developed them, for longer climbs.

Because Mars was the opposite of safe.

While Pema was their most senior climber, she declined being first into the tunnel—an honor Serafina would cheerfully have ceded to the other woman. “I should remain behind as your rescue climber on this first attempt,” Pema said over the radio. Logical. Practical. Firm. “I doubt anything will go too far amiss on our first day, but best to be careful.”

Serafina felt a surge of gratitude for Pema’s calm competence—and for the trust the other woman had just quietly expressed in her and in Tahar.

They suited up, checking each other’s seals. Checking their own ropes and carabiners, and then checking each other’s, as well.

“It’s going to be fine,” Tahar said, pressing his helmet to hers, letting his voice transmit to her ears by conduction through the polycarbonate shield. A more personal, intimate means of communication than the radio. “We’ll do great.”

“I know.” She patted his helmet. “I’m just remembering the way we met. The ice caves up in Michigan, in college.”

He rolled his dark eyes behind his visor. “Don’t remind me. The seams in my gloves burst. That was a nasty case of frostbite.”

Serafina snorted. “That’s not what I meant, and you know it.”

The university had sponsored the group adventure. And while she’d grown up climbing in the Rockies, it had been her first time ice-climbing. The skills had at least been laterally equivalent, but the gear had been subtly different. She’d felt out of her depth and unsure.

But then Tahar, then a stranger, had tied off their double ropes. Security in redundancy. He’d looked at her, asking simply, “Do you want to go first? Or do you want to follow me?”

He’d left the decision to her. Had relied on her to evaluate her own ability honestly. Had *trusted in her*, with an immediacy she hadn’t expected of a stranger. And that trust had spurred her own in him. “I’ll follow,” she’d replied.

That trust had been forged and tempered in dozens of other climbs throughout their college and grad school years. Through the grueling candidacy phase for inclusion in the Mars missions. And now, here, too. Safe and not safe, all at once. “We’ll be great,” she finally said, unable to put it all into words in any way that wouldn’t make him laugh and tell *her* that she was the hopeless romantic, not him. “Let’s go.”

Out on the surface now, the feather-light gravity and the sky, so empty of buildings and trees and *everything* made her feel faintly agoraphobic. That sensation passed as they hammered their first pitons into the rock at the rim of the lava tube and set their ropes. Serafina knew that every piece of equipment they had, had been heat treated to eighty degrees Celsius for fifteen minutes before they’d been allowed out of the Cydonia habitats with it in hand. The only exception to this was the carbon fiber props and shells of the drones, which had instead been sterilized with quick bursts of ionized gas, so as to avoid melting the carbon or making it brittle. Thus, contamination wasn’t an issue.

The cold, however, was. While it was summer here, close to the southern polar regions, their suit heaters were already working overtime to compensate, and her wrist computer registered the outside temperature as negative fifty degrees Celsius.

They began by simply lowering a rope with a light on it to get a feel for the descent, while Elimu’s drones buzzed around them. “Basalt,” Tahar said, his tone approving. “Nice and strong.

I think I see lavasicles down below. Should be interesting. You want to go first?"

Serafina inhaled deeply, appreciating again that he always *asked*. "Yes, I think so. If I run into trouble, you can pull me up more easily."

Then it was just. . . climbing. A skill developed in Earth's gravity, made easier in the gentle embrace of Mars, but she still had to focus on just this moment. The balance of her body as she hung, toes in her thick boots gripping the wall as she shifted her grip. Progress sometimes only measured in centimeters.

Then her feet hit the floor of the lava bubble, and she stepped away from the wall, preparing the ropes for Tahar's descent.

They took it in turns like that, leaving repeater antennas behind them, so that they wouldn't fall out of radio contact with Pema and Elimu, and their helmet cameras and lights active and transmitting the entire time.

No sound but the harshness of their own breath in their ears, the hiss of the rebreather. The scuff of their own feet on stone, reverberating up through their suits.

At the top of another descent, Tahar asked into the radio, "You want to try to fly the drones using the repeaters, Elimu?"

Static. "Not a good idea, I think. I could lose them in a crevice when the signal dies, and never get them back. Let's stick with dropping cameras on lines for now." A pause. "Though thank you for your consideration for our boredom back here. I could use more to do."

"Cherish the boredom while it lasts," Pema cut in over the line, and Serafina chuckled.

Careful, meticulous work. LIDAR measurements of each tunnel, each cavern. At a certain point, Serafina noticed ice along the walls and gripped Tahar's shoulder, pointing at it.

"It's never had a chance to evaporate and sublime away," he said, awed. "It's never been touched by the sun. Not for a billion years, maybe."

Grimacing like children, they took photographs. And then, hands shaking, Serafina took samples, trying not to feel as if she were profaning a temple.

A few minutes later, they had a choice of several smaller tunnels. After a few meters, Serafina stopped. "Starting to get a little tight," she reported on the radio.

Another burst of static, then Pema's voice broke through. "Time for you to turn around, anyway," she told them. "You're nearly at the halfway mark on your air."

Chagrined, Serafina checked her wrist-unit. Sure enough, they'd been at this for an hour. "Easy to lose track of time down here," she admitted, and they retraced their steps.

* * *

The second day, Pema and Elimu went down, following the maps already drawn by the first exploration team. Serafina sat in the rover, trying to conduct baseline analysis of the ice samples they'd taken, while Tahar studied samples of rock he'd taken himself, looking for zircon crystals that might have ancient water trapped inside. "Useful for dating the age of the rock," he noted.

Pema and Elimu's exploration passed uneventfully, but they'd found a deeper crevasse. "We've got ropes and tanks rigged for you tomorrow," Elimu told them, his voice regretful as they began their ascent. "Just didn't have time to get all the way down there. We're seeing more and more ice. Think we'll find your aquifer, and it'll just be frozen?"

"I hope not," Serafina answered over the radio. "But I'll take whatever we can get."

The third day found Tahar and Serafina suited once more. The cave now had the slight comfort of familiarity, but Serafina reminded herself not to take it for granted. Cave exploration on Earth carried familiar dangers, and everyone in caving heard the horror stories. People who'd misjudged the width of tunnels. Gotten pinned, trapped beyond the ability of any rope and pulley system to pull them free—and had died, head-down in a hole, when their laboring hearts had just given out. Those horror stories had names—Mosssdale. Nutty Putty Cave. Peak Cavern. Serafina didn't want to add this nameless cavern to the list of underground tombs of lost climbers.

All those issues were compounded on Mars with the hazards of scuba diving—loss of oxygen. Distance from backup or rescue.

"You were right," Tahar said as they checked the lines Pema and Elimu had set for them the

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previous day.

"I'm always right," Serafina replied blithely. "But what was I right about this time?"

A snort. "That coming to a place where it's not safe brings out the best in humans, not the worst. It forces us to rise above our pettiness, our selfishness." A pause. "There's no place I'd rather be than here, with you."

And then down into the darkness, Serafina leading. This tunnel was thick with ice, something they hadn't predicted. They needed to use crampons over their insulated boots, and ice axes in places, during their slow descent

They knew that there was another small tube that seemed to parallel this one, but Pema had judged it too small, too clogged with ice to be safe for Tahar and Elimu, both of whom were big men even without their bulky suits. Having measured it with LIDAR, everyone had agreed that the wider tunnel was the better descent—but not far from where they currently hung, she could see what was probably a tunnel where the two tubes rejoined, and she held the LIDAR gun on the aperture, measuring it dutifully for the records.

Down. And down. "Ambient humidity is picking up," Tahar called over the radio. "I think I can feel . . . wind? Rising up to meet us?"

"I feel it," she answered, pausing in her descent. "And something else. Like movement in the stone. Like . . . vibration?"

Looking too far down was stupidity in any long climb, but she risked a peek. And yes, some thirty meters further down, there was a difference in the darkness. The lights on her helmet reflected, but not the white of ice, but the black-silver of liquid water underground. The white of water vapor rising from it, only to freeze once more in the ice-rimed throat through which they were climbing. Another thousand years, and the water below would clog the entire tube with ice. . . .

Realization hit. "We found it! We found a liquid aquifer!"

"We did it!" Tahar crowed.

And that was when the rock and ice above them, which looked stable enough for another billion years, but cracked by their axes and pitons, crumbled and fell. Just a few pebbles at first, slow in the low gravity, but Tahar shouted "ROCK!" and Serafina plastered herself to the wall, tucking her head. Three points of contact—both feet, one hand. The backup of the dual rope system. One arm over her vulnerable head and the precious helmet—

And then the ropes yanked at her as Tahar, struck by a larger rock, was torn loose and fell. Dream-like slowness, windmilling limbs striking her as he slid past. She reached her free hand out for him, risking impacts to her own helmet, but with nightmarish logic, he was simultaneously horrifyingly slow in his motion, yet too fast for her to catch.

Then, dead weight at her waist, pulling her down. Rocks pelting her head—she cringed and wrapped her arm back around her helmet, not daring to look up, for fear that her visor would be cracked, compromising her suit's integrity.

After what felt like an eternity, but that was probably less than a minute, the rocks and ice stopped falling, and Serafina looked around, dazed, trying to assess their situation.

Her heart spasmed and then beat triple-time as her helmet lights swept the area below. Tahar hung upside-down, only his feet visible, pinned by hundreds, if not thousands of pounds of ice and rock. The tunnel below, leading the to aquifer, was now clogged. The tunnel above her was similarly jammed. The tiny side tunnel, which might lead to the tube Pema had discounted as too small, too dangerous, was her only potential exit, other than attempting to dig out the debris overhead.

"No, no, no, *no* . . ." Realizing that she was panicking, Serafina forced herself to exhale entirely and then took a single long, controlled inhale. *Again. Get it together. The suits are rigid and filled with a tmosphere. He might have been shielded from the worst of the impacts.*

One more deep breath, and then she triggered her radio. "Tahar? Can you hear me?"

No reply.

"Pema! Elimu! Do you copy?"

Static. The repeater antenna they'd set up closest to this area might either have been damaged

by the collapse, or was simply blocked by tons of material.

She'd never felt this alone, this cut off, in her entire life.

Damnit. What next? Think!

She cautiously slid down the wall towards Tahar and gingerly dug at the debris around him. Then his voice came over the radio, and it was the most beautiful thing she'd ever heard. Thick, groggy, disoriented. . . but alive. "Sera. I'm pinned."

Thank you, god. "I know, I'm digging you out."

"No. You need to get the others."

"I'm not leaving you. We're getting out of this together." The remorseless code of climbers. You put your life in each other's hands. You were, ultimately, responsible for each other in a way most people never experienced. Never understood.

She kept digging around, trying to loosen the debris. *Bloodflow going straight to his brain can't be good. Especially if he's got a concussion. . .*

"Sera, you're going to need the others. Pulleys. Ropes. I can't feel my legs. I'm not climbing out of here."

The words refused to make sense for a moment. Then understanding clicked into place, and she exhaled again, this time on a silent, voiceless scream.

"You understand me, Sera?" Tiredness in his voice now. Inevitability. "You need to get back up to them. You're not carrying me out of here."

"The way up is blocked. If I dig at that, I'll just bring more debris down on you."

"Try the side tunnel."

"I could get pinned, too."

"Might get you close enough to the radio repeater. Be smart about it. Try to get out. Get them. It's the only way we both get out of here."

She had the feeling that he was offering her an illusion. But any hope was better than none. So she started into the side tunnel.

As expected, it was a narrow fit, and she had to climb it like a chimney, feet braced on one side, back against the opposite wall. She'd have preferred to use her ice axe, but that had been swept out of her hands by the rockfall.

Up and up. Serafina sweated in her suit, trying to slow and control her breathing. *Can't run out of air. God, how I wish I had Pema's genes. She wouldn't run out of air.*

Inhale. Exhale. In through the nose. Out through the mouth. *Get up to where the return tanks are set—god, I hope this tunnel doesn't widen out. No ropes. No axe. Just me and the crampons.*

It's not going to be enough, is it?

As she climbed, she kept talking to Tahar to keep him conscious. But his answers veered and wavered, not always connecting to what she asked. "You ever hear of the Altamura Man?" he asked, his voice slurring in her ear.

The radio connection between filled momentarily with static, and every foot she ascended meant that she might never hear his voice again, but if she didn't *move*, she couldn't save him. "Sounds like a hippy. What about him?" she asked, shoulders straining against the tube. *One more meter. Come on. Just one more. Then worry about the next one.*

"They found him in a cave in Italy. Neanderthal. He'd been there for a hundred thousand years. Pinned upside down in a cave, like Saint Peter on his inverted cross."

She tended to forget that he'd been raised Catholic. Serafina leaned her head back against the icy wall for a moment as his slurred voice continued, "I always wondered . . . how he died. If he ran for help. If he fell and was trapped that way, screaming for help, till he died of thirst or his heart just . . . stopped."

Serafina froze in place, unable to move a centimeter further. "Don't think about that," she pleaded. "Tahar, don't *think about that*."

"He's a stalactite now. Become a part of the rock. I always figured that when we died here, we'd become a part of Mars. Cremated, sure, sprinkled in the gardens underground in Cydonia . . . but a measurable amount of Earth's carbon, transported here to become part of this world."

She forced herself further up, and then had to traverse a tricky bend, where the chimney changed angles, and finally found herself on her belly, inching her way up. "Tahar, please. Hold on," Serafina begged into the radio. "Just *hold on*."

"It's beautiful," he told her after several more agonizing minutes of upwards struggle "There's light. Shining in the dark."

She didn't have the breath to reply.

She couldn't quite believe it when she managed to emerge from the other end of the narrow tunnel. She felt like she'd been birthed out of an icy womb. Winded and exhausted, she tabbed her radio again. "Pema? Elimu? We need help."

And then a welcome crackle of static. "You missed your check-in!" Pema, normally imperturbable, sounded frantic. "What happened?"

"Cave-in. Tahar's trapped below. . . ." Serafina wanted to stop moving, but an eye on her wrist panel told her that her oxygen was running low.

Which meant that Tahar's must be, too. *How long did it take me to traverse that side-tunnel? Oh my god, I took too long—*

Lights. Lights shining down from above. Shadowy figures scrambling along the wall above her, carrying extra tanks. Serafina wept as they hooked up the additional tanks. Begged them to help Tahar, not her. Beat at the unyielding walls with her hands when Elimu just shook his head at her solemnly. "I made it through the side tunnel, if Pema and I go down together. . . ." Serafina stopped talking. Slumped in on herself. *It took me an hour to traverse the side tunnel. By the time we get down there with tanks, he'll be out of oxygen.*

"He's already dead," she said, her voice flat, part of her unable to believe the words as she said them. "That's why he sent me back. He knew."

Pema touched her shoulder gently, all the compassion in the universe compressed down into the pressure of those fingers, scarcely perceptible through the stiff material of the suit. Serafina's knees buckled. *He knew, god damn it, he knew, no, no, no—*

"Come on. We have to get you safe, first and foremost," the other woman said softly.

She stopped resisting and let them take care of her. They got her back on her feet. Took her back up to the rover, where they checked her for concussion, of which she had every sign, including the sensation that she was about to float out of her body.

She'd have welcomed that. To just close her eyes and escape. To find Tahar.

Instead, she endured the condolence calls from Cydonia. Mechanically ate the preheated food Pema put in front of her as she huddled in the same rover with the other two. Warm, familiar smells that she'd never share again with her husband.

What was the last thing I said to him? What were the last words he heard? She couldn't remember and blamed herself for that, too. *Did I at least say that I loved him? Or did I just yell at him to hold on, because I was the one who couldn't bear the thought of losing him?*

Blank absence in the bench across from hers. Blank absence in her mind.

"We have to go back," Serafina finally told them, her voice still blank and her mind still empty.

Pema eyed her warily. "It won't be a rescue."

"I know that." Words took effort. "We have to recover his body. Not just out of respect. There's a liquid aquifer about thirty meters below where we were. Not only was studying the aquifer the point of the mission . . . for which he gave his life . . ." Serafina swallowed. "But if his body slips into the aquifer, sooner or later, he will contaminate it." Wretched thoughts. "That water's above freezing, and might come from a still-warmer source. His body, which might be freezing now, could drop into the water. Fluids would eventually escape the suit."

She didn't know how she could be this . . . dispassionate, when every exhalation extended out and out and out until she had no breath left, each a silent scream of *no*. And yet, her voice stayed steady, even as tears leaked down her face in a silent, steady stream. "He will contaminate any ecosystem there might be. He . . . wouldn't want that."

She saw their wary glances at each other. *They think I'm crazy. If I were them, I might agree.*

"We'll check with Cydonia," Elimu allowed after a moment.

She didn't think she could sleep, but did, fitfully, though they woke her every two hours to check her pupils for concussion symptoms. And in the morning, Cydonia agreed sorrowfully that Tahar's body *must* be retrieved.

Serafina didn't know how she was going to make herself climb back down into the icy womb from which she'd escaped the day before, which now looked like a remorseless maw. Concussed as she was, Pema and Elimu led the climb, and she simply followed numbly in their wake. Their calm competence . . . helped.

They wound up digging through the ice and rock clogging the main tunnel, for safety's sake, a process that took several days. It was better not to think when they found his legs, intolerably stiff now. So she held herself as an empty shell, a lava tube with nothing left inside but a slowly cooling void. *Life is change. Living is a adapting to change.* The words sounded trite inside her head. *Fuck change. I don't want to change. I don't want to be whoever I am without him.*

And when they'd broken through to where he'd lain, head down, the lights on his helmet broken, faceplate lightly cracked and glazed with frozen blood, and removed his body, Serafina sat on a rock ledge, staring into space. "He kept saying, at the end, that he saw lights," she mumbled. "The lamps on his helmet are broken. Had to have been bloodflow. Damaged brain tissue. Something."

Elimu turned towards her. "Please don't think I'm crazy, or morbid," he said gently. "But I'm going to drop further down. No lights. I want to see what he saw."

Serafina raised her head, puzzled. But she didn't have it in her to object as Elimu slid through the opening they'd enlarged, even as Pema secured the knots on the ropes they'd use to raise Tahar's body out of here.

After a moment, a muffled cry, and Elimu scrambled back up. "Go down," he told Serafina, the words tumbling out of him. "You must. You must see. But keep your lights turned off." He put a gloved hand on her shoulder, as Pema had yesterday. Simple human contact. "I think this might help."

There didn't seem to be much point, but she was simply drifting now, pushed this way and that by air currents. A concussed balloon with no motivational force of her own.

Serafina dropped down, clutching the ropes in her gloved hands. Let her eyes adjust to the darkness, ignoring the cool light behind her, mostly obscured by the ice that had trapped Tahar.

Bu then . . . yes. Out of darkness, light. Phosphorescent and cool, it glowed along the edges of the aquifer in a lace-like tracery. Tahar had seen it with his dying eyes, the only light left to him. With her helmet lights on, she'd never have seen it at all. "Oh my god," Serafina whispered.

"Is it life?" Elimu asked urgently from above.

"It . . . could be mineral. But it looks like to me like bacterial mats. We'll need a sample." Refuge in the mechanics of science. Sample, test, observe, repeat. Serafina clambered back up, her eyes straying to Tahar's silent, empty form.

It was exactly what they'd hoped to find. Life beneath the surface, in a womb of ice. Perhaps, at some future date, she'd be able to cling to that. That his death had led to discovery, children of the mind that they'd never had in the flesh. But not today.

But in the underground river below, though they could not have known it, minute particles of Tahar's blood, which had dripped through his cracked visor, swam in the chill water, the multitudinous essences of a human body meeting a Martian ecology directly for the first time. For better or for worse, change had come to Mars for the first time in billions of years.

And all life on this red orb would now, inevitably, have to change, adapt, and evolve. Human and alien alike.

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