

Conquering Europa

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I.

Alice should never have agreed to meet with him like this, but it was too late to change her mind. Pascal bounded across the frozen, shattered wasteland ahead of her, leading her farther and farther from the Deck. When she glanced over her shoulder she saw the facility had disappeared behind an outcropping of blue ice.

The ground ahead stretched to a close, jagged horizon, ravaged by deep fractures filled with frozen yellow slush. Jupiter loomed enormous overhead, blotting out the stars with fierce jealousy. Its swirling hell of storms cast Europa's ice in an orange glow. The tiny world was so desolate, Alice thought; so terribly beautiful, and Greaves-Kaplan wanted to spoil it all! How could they be so heartless?

Pascal was right about one thing: the moon's virgin beauty had to be protected. Still, Alice's conscience grated against her. She shouldn't be meeting with Pascal behind Scott's back like this.

A voice crackled in her helmet. *"Alice, Pascal, this is Nikolai. I lost sight of you. Everything okay?"*

Had she beaten Pascal to the reply, she might have screamed *no!* and turned back to the Deck. But Pascal just said, *"We're fine. We want to catch a glimpse of the flexi before coming back in."*

"Make it quick. Landon's ship arrives in an hour."

Alice bit her lip and kept following.

They stopped at the brink of a sprawling glassy chasm three kilometers wide, spiked with frozen splashes of water and foam hundreds of meters high. The moon had literally torn itself asunder here, vomiting up the massive formations of ice that now loomed over

the plain. Europa's entire ice shell was fractured like this, forming intricate radial patterns that were visible from space. These *flexi* were caused by tremendous tidal pressure from Europa's subsurface ocean. Europa's eccentric orbit around Jupiter, coupled with the sun's distant but powerful pull, induced a chaotic, irregular tide that cycled around the planet every three-and-a-half days. Complex tidal interactions with Jupiter's other Galilean moons also caused severe, more unpredictable tides. The titanic forces clashing on Europa, and the rotation and revolution of her orbit, swept these tides around, stretching and flexing the surface. When the ice cracked, subsurface water boiled away into the vacuum and flash-froze, plugging the fracture with a new layer of ice. The majestic *flexi* developed in a violent, frothing chaos lasting only minutes.

Pascal stopped a safe distance from the edge and butted his faceplate up against hers. Beads of perspiration dotted his face. His eyes looked dark and furious. When he pointed at the control pad on her wrist, she reluctantly disengaged her radio transmitter.

"What's this about, Pascal?" she shouted.

He shouted back, but the sound reaching her through the glass was only a muted whisper. "Look at it, Alice. There's nothing like it anywhere else in the Solar System. Europa is the only place where we've discovered life, and we've only been here a few months. She still hides treasures we can only imagine."

Alice felt her heart pounding in her chest. She knew where Pascal was leading. "You're not out here to convince me of Europa's majesty."

"Scott is handing Europa over to rapists, and you're the only one who can stop him! Damn it Alice, they have the entire Solar System at their disposal. Space is theirs to

command, but they set their sights on Europa, the one place we all know they don't belong. And Scott is just letting them come."

"He's made his decision, with ESI's approval. Landon's ship is already en route from Ganymede. What do you expect me to do? Call him up and tell him to turn his spaceship around?"

"I'm serious, Alice. You're the only one Scott goes to for advice. Tell him to oppose Greaves-Kaplan. We can't stop Landon from coming, but we don't have to welcome him with open arms. What if we tell him no, he can't bring Greaves-Kaplan to Europa? Has Scott even considered that? So far Greaves-Kaplan has been manipulating the ESI treaty, and we've been allowing them to do it, but what if we draw the line? They'll have to either violate the treaty outright-which is dangerous to them-or leave Europa alone."

"I've already had this conversation with Scott. His mind is made up."

"If Scott won't draw the line, maybe you should. The crew would follow you if it came down to it."

Alice felt her hands tremble in her gloves. She looked around Pascal's helmet, at the frozen majesty of Europa. God, she loved the ice; her soul connected with the alien wilderness in a way she didn't think even Pascal could understand. She would do almost anything for Europa, even to the point of giving her own life.

But she couldn't betray Scott, not like Pascal was asking of her, even though her instincts told her he was right. If ESI took a stand against Greaves-Kaplan, the corporation would probably leave Europa alone. Pascal had thrust the choice into her hands. Whom did she love more? Scott or Europa? Alice felt herself torn in both directions. Finally she shook her head in her helmet.

"I won't do it. Scott needs me now. I'll talk to him, I'll encourage him to stand up to Greaves-Kaplan, but I'm not going to undermine his authority."

Fury flashed through Pascal's eyes. "I'll ask you one more time."

"The answer's no."

Open hatred smoldered in his gaze. "Consider yourself warned, Alice. If you won't do something about this, I will!" Before she could answer, he broke contact with the faceplates and bounded back toward the Deck.

Alice switched her helmet radio back on. She let Pascal get ahead before starting back after him. Butterflies danced in her stomach. Pascal had always held strong opinions, but she'd never seen him this passionate.

She was halfway back to the Deck when a burst of static interrupted her thoughts. "*Alice, Scott here. How are the repairs coming?*" She had been helping Nikolai repair a broken fuel cell when Pascal had called her away from the Deck. Though her primary role on the crew was astrobiologist, her extensive cross training included a heavy dose of engineering skills.

Swallowing down the rising sense of guilt, she said, "All finished. I'm on my way back in." Alice watched Pascal bound toward the Deck ahead of her, a lonely figure against Europa's desolate horizon. "I hate you for doing this, Scott. I can't forgive you."

"It wasn't my decision to make, Alice. You know that."

"Yeah, I know, but I'm still angry." She paused to stare back over her shoulder at the titanic flexi. "Do you think Europa understands? Do you think she'll forgive us for letting them come?"

Silence. Then, "*Come inside, Alice. We have a lot of work to do.*"

When Scott had announced an engineer from Greaves-Kaplan would be spending three nights on the Deck in preparation for a larger Europa project, reactions from the crew had been mixed. Nobody liked it, but some accepted it with dull resignation. Others were furious. Tension among the crew had been dangerously high since the announcement.

When Alice arrived on the utility deck after a frigid shower, most of the crew was already there. Even with sixteen people crammed into the tiny space, silence permeated the air. Everyone wore angry or discouraged expressions as they waited for the Greaves-Kaplan craft to land.

Scott appeared out of the crowd. "Alice, good. I was starting to wonder if you would show." He was usually a vigorous, high-spirited man, but the recent tension had taken its toll. The muscles in his face were taut with worry. His troubled eyes flickered among the faces in the room as he slipped an arm around her waist.

Though they had lived as husband and wife for eleven years, Alice had never formally married Scott Gresham. When they met on the ice in Antarctica, far from the establishments of government and church, marriage hadn't felt like a pressing need. They loved each other, and that was sufficient. Fortunately their common love of Europa had allowed them to remain together for so many years.

She rubbed his back. "Don't worry. I don't like it any more than the rest of them, but I'm not going anywhere." *Except out on the ice with Pascal, behind your back.* She tried to stifle the guilt welling up inside.

He kissed her on the cheek. "I don't know what I'd do without you."

The guilt expanded and strained against her insides, looking for a way out. She should spill everything, tell him what she had done and what Pascal had said, but she couldn't. Was this how Europa felt when the tides pressed against her, in those moments before her shell cracked? "Oh, you'd do just fine." *Probably better.*

Scott squeezed her tighter. "Have you seen Pascal?"

"No." She blurted it out before she could think. A lie. Quickly she added, "He was outside with Nikolai and me, but I only talked to him in passing."

"When I saw him at lunch I specifically told him to be here. He glared at me and walked off, and I haven't seen him since."

"It's probably better that way. Let him blow his steam when nobody else is around to see it."

"I don't know, Alice, I'm worried about him. If he does anything to offend Landon-" He shook his head. "Greaves-Kaplan ships gave ESI the ride out to Europa. If Landon doesn't like what he sees here, he can pressure Greaves-Kaplan to end our contract and we'll have no choice but to go home."

"Maybe you should stand up to Landon," she suggested, touching his shoulder, remembering her promise to Pascal. "If we take the initiative now, we could end this. Backing out of our contract won't be easy for Greaves-Kaplan. Neither will tackling the Europa Treaty. We'll never have a second chance after today."

"Alice," he scolded, pulling away and regarding her angrily. "We've been through this a thousand times. I want to keep Greaves-Kaplan away too, but as much as we like to think it, we're not the lords of Europa. ESI doesn't have the authority to control her destiny."

"If we don't protect her, who will?"

Scott shook his head. "You're starting to sound like Pascal."

Alice's heart lurched. She stayed silent as they continued waiting. She periodically checked over her shoulder to see if Pascal would arrive. He never did.

"So how was the flight from Ganymede?" Alice asked between bites of freeze-dried beefsteak. The crew sat wherever they could find space in the multipurpose common room. Alice and Scott sat with the Greaves-Kaplan project manager at the tiny dining table. Pascal, who had made an embarrassingly late entrance, sat on a storage crate nearby.

In a society where multinational corporations oversaw multibillion-dollar projects that required thousands of skilled laborers, it was rare that a single individual could take credit for a project's success. Elliot Landon, director of Greaves-Kaplan's Jovian operations program, was an exception. He had been the one to bring mankind past the orbit of Mars, into the outer Solar System. His vision had shaped Greaves-Kaplan's operations for the last ten years. Not content to be a desk jockey, he led the charge from the front. And now Elliot Landon-visionary, engineer, planetary extortionist-sat across from Alice at her dinner table.

"The flight was fine, thank you, although I'm glad to have my feet on solid ground again."

"Enjoy it while it lasts. I understand you wish to go on the next dive?"

"Yes, if it's not an inconvenience. I'm eager to see these native Europeans I've heard so much about."

Alice had to confess, he was charming. She hadn't known what to expect, but it certainly hadn't been this lean, handsome man with elegant features and glacier blue eyes. He had a comfortable, intellectual demeanor that was hard not to appreciate. Still, Alice felt uneasy. As handsome and sophisticated as Landon might be, he still wanted to bring Greaves-Kaplan to Europa.

"We have a seat saved for you," she said. "I hope seeing Europa's ocean will give you an appreciation for the European Studies Initiative's concerns about industrialization."

The implications of her statement were many. Landon just nodded courteously. "Your discoveries here are the subject of much talk on Ganymede, Dr. Sansight. Greaves-Kaplan is considering all the factors in its decision."

In the brief silence that ensued Alice sensed the conversation was heading into dangerous waters. Scott must have sensed it too. "How are things on Ganymede these days?" he asked cheerfully.

"Very good, actually. Population capacity is up to fourteen hundred now, and we're nearly self-sufficient. Soon we can start shifting our efforts from the Ganymede colony to Jupiter itself. We plan to deploy the first samplers in eleven months."

"Remarkable," Scott murmured. "Atmospheric mining. Will it work?"

Landon chuckled. "I hope so. Eighteen billion dollars is betting it will." He took a sip of his European water—the only drink available on the Deck in any abundance. "If the initial sampling is successful, we'll move to the next phase of the project. That means constructing orbiting collectors and refineries. They'll need oxygen and water from somewhere. Mass drivers on Europa can eject all the necessary resources into Jovian orbit."

From beside the table, Pascal blurted, "Mr. Landon, have you ever been to Antarctica?" He made no effort to conceal the bitterness in his voice.

Alice turned to him, shocked. He glared back, with a look that said, *I warned you. Now it's my show.*

Landon blinked. "Yes, why?"

"We all spent four years training there. Antarctica is Earth's last great wilderness. It's magnificent, very much like Europa in ways."

"Oh, I quite agree. Antarctica often feels more alien to me than Mars or Ganymede. What was it R.F. Scott wrote?" In a dramatic voice he echoed the great Antarctic explorer. "Great God! This is an awful place and terrible enough for us to have laboured to it without the reward of priority."

Pascal hesitated. Apparently he hadn't expected this answer, but seventeen pairs of eyes were on him, so he stumbled forward. "For the greater part of the twentieth century the Antarctic Treaty Organization ensured nobody would exploit the continent, but some nations broke the treaty anyway. When it expired the rest of the world moved in for the kill. Now oil miners, hunters, and fishermen are ravaging the environment. Earth's last wilderness is being destroyed." Alice sharpened her gaze, but Pascal pressed on. "We hoped we would learn from our mistakes. That's why the European Studies Initiative was formed; to protect Europa from the same fate that befell Antarctica."

All the conversation in the room had died. Every eye was fixed on Landon. He chewed his beefsteak thoughtfully before answering. "Mr. Couturier"-he read the nametag on Pascal's jumpsuit-"ESI is a private organization. Its European Treaty is not endorsed by any government."

"It's backed by two hundred thirty-seven scientific and educational organizations!"

Landon raised a hand. "Hear me out. Your treaty is noble, and I admire ESI's painstaking efforts to protect Europa. It shows the ability of Earth's scientific community to unite for a cause; it is a statement of vision; but it is *not* an official, binding treaty."

Pascal tried to protest, but Landon kept going. "With that said, don't write me off as a heartless scrooge. Despite what you might think, Greaves-Kaplan is not on a crusade to spoil Europa. In fact, we're taking every possible precaution to ensure our impact on Europa is minimal. Our plans call for just two complexes on Europa's surface, little larger than this Deck of yours. All our operations will remain above the ice, safely away from the subsurface life. Though we do not abide by the letter of your treaty, we abide by the spirit of it."

Pascal muttered, "How noble." He rose from his crate, slammed his food tray down on the kitchen counter, and stormed out of the room. In his wake he left absolute silence. Alice spun back around to face Scott.

"I'm terribly sorry, Mr. Landon," Scott stammered. "Pascal has strong opinions about Europa. I apologize for letting the conversation get that far."

"No harm done. I've dealt with my share of radical environmentalists. Earth is full of them. Mars and Ganymede are even worse."

The conversation after that was strained. Scott did his best to carry on, and Alice did what she could to help, but awkward stretches of silence interrupted the conversation. Alice finally suggested they turn in early and get some sleep. They would be up early for the dive. Scott shot her a grateful look as he left to show Landon to his quarters. Alice straightened up the room, then proceeded down the ladder to Scott's and her quarters.

Alice had just changed into her nightgown and slipped under the covers when Scott burst through the door. His face was bright red, the veins in his forehead standing out in a prominent "V". He slammed the door shut. "You knew!"

Alice jumped up in bed and scooted back against the headboard. "What are you talking about?"

"You lied to me! Nikolai just told me you saw Pascal today. He said you two went off out of view for a private chat."

She pressed her lips into a thin line. When she didn't argue, Scott slammed a fist into the opposite hand. "It's true, then. Goddamn it, Alice, I can't believe you'd go behind my back like this. Do you have any idea what it's like, trying to moderate between ESI, the Deck crew, and Greaves-Kaplan? I thought you of all people would understand that." Alice, red in the face now, tried to speak but Scott cut her off. "He told you what he was going to do, didn't he? He told you he was going to provoke Landon like that."

"Would you just listen?" she finally shouted. "Yes, I met him because he asked me to. I shouldn't have done it and I'm sorry. But he didn't say a word about what happened tonight."

"So just what did he tell you?"

"He wanted me to circumvent your authority and stand up to Landon. Because you wouldn't do it yourself, Pascal came to me."

Scott's anger melted into disbelief. "What?"

Alice got out of bed to stand at his level. Now it was her turn to be angry. "He wanted me to undermine your authority and force Greaves-Kaplan to go back home. You know it would have worked. The crew would stand by me if I opposed you on this."

Scott stood in stunned silence.

"I told him no. He put the choice in front of me, Scott: you or Europa. I love Europa with every fiber of my being. I've dedicated my life to pursuing, exploring, understanding her. Europa drives my life. But I didn't choose her. So maybe you should think next time before barging in here in all your righteous wrath. I could have cost you everything tonight."

Scott stared dumbly back at her before his eyes fell away and wandered around the room. "Europa or me." His Adam's apple moved in his throat. "Boy, I'm glad to know I'm right up there on your list of priorities. You may not have chosen Europa, Alice, but do you know something? You haven't chosen me either. In eleven years you've never been able to decide. You're still caught in between. If you want Europa more than me then fine, make your choice! Just stop playing these goddamn games."

He stormed out of their quarters, slamming the door behind him. Alice stood for a moment, fists at her sides, wondering if he would come back. When he didn't, she crawled back under the covers. She couldn't fall asleep.

II.

Alice was in the dome doing the pre-dive inspection when Scott and Landon shuffled in at 0245. Scott only wore thermals and his jumpsuit to ward off the cold.

Landon, in the more typical European fashion, wore a heatsuit, though his was of Greaves-Kaplan design. Steam rose and swirled away from his body.

"Morning," Alice called, glancing up from her checklists. She wore a red, body-conforming heatsuit like Landon's, only older and less sophisticated. ESI had pioneered the technology years ago in Antarctica.

The sound of crunching ice reverberated through the dome as the two men walked around the circumference of the pool occupying most of the dome's area. The murky water was several meters below the level of the perimeter walkway, sloshing against the sides of the shaft. Its high concentration of sulfur compounds tinged it yellow. Chains suspended *Vostok* halfway out of the water.

"How does she look?" Scott asked. His voice was cold, formal. Alice knew he didn't want to deal with what had happened last night. Neither did she.

"Good, except two of the batteries didn't charge last night. Dennis is taking a look." To Landon she said, "Dennis Hoffmeier is our resident expert on the submersible."

Dennis waved from where he lay on the *Vostok*'s deck, mostly concealed between two oxygen tanks, tools scattered around him. "I found the problem," he called down. "One of the connectors cracked from the cold. Go ahead and dive, and we'll worry about it when you get back. You've got plenty of juice from the other three batteries. Just allow yourself time to get back to the surface before the dive window closes."

Alice glanced at Landon, who was walking in slow circles around the submersible. "This is marvelous technology for a privately financed mission," he said. "Greaves-Kaplan could learn a few things from ESI."

Alice shrugged. "Greaves-Kaplan is a broad organization, but not deep. ESI has spent eleven years becoming the expert on European exploration. Before we came to Europa, we were testing our technology in Antarctica and on the floor of the Pacific."

Scott lingered for a moment, not meeting her eye. She didn't know if he was waiting for an apology, but if he was, he wasn't getting it. She was still furious about the things he'd said last night. Finally he told her, "I'm heading back inside. Have a great time, Mr. Landon. Alice, take good care of him."

From across the dome Landon saluted. "See you tonight."

With a final glance at Alice, Scott walked through the door leading back to the Deck. Alice sighed. So this was it; just she and Elliot Landon, alone with Europa for the next eight hours. The prospect wasn't thrilling, but she could use the time under the ice, away from Scott.

She folded her checklists. "Prediver's done, we're ready to go."

Alice led Landon aboard, and settled into the pilot's seat on the left. He took the one on the right. The heaters had been running for a while, so it was pleasantly warm inside. Alice turned off her heatsuit using her wrist controls.

The submersible was tiny and cramped, but after twelve dives on Europa and fifteen years of experience back on Earth, Alice felt right at home. Landon looked less certain.

"Hang on to that overhead rail," Alice told him. "It's a bit rough at first." She grabbed her own rail with her left hand, and thumbed a button with her right. The muted sound of metal chains dragging over ice filled the cabin. A moment later the *Vostok* shuddered and sank into Europa's ocean. The entire front side of the cabin was transparent, allowing Alice to watch the water level climb, until the *Vostok* was completely

submerged. External floodlights pierced the murky water to illuminate the icy shaft walls. Alice flipped a switch and the chain released its grip.

Vostok began its descent.

Elliot was an engineer and a problem-solver, but he was more than that. Whatever Greaves-Kaplan might think, his engineering projects were not about technological progress or dollar signs; for him, they were about engaging the raw forces of nature in battle. On Earth he had ice climbed in Antarctica and trekked two hundred miles in the footsteps of her early explorers. He had climbed the highest mountain on each of the seven continents. Greaves-Kaplan sent him to Mars, where the challenge was more intellectual than physical as he developed technology necessary for colonization. Now he fought the greatest battle of his life. He sought to conquer Jupiter, king of the gods, greatest of the planets. Already he had tamed Ganymede; he had only to tame Europa before he dueled with the planet itself.

As he descended down the ten-kilometer shaft, he felt the thrill of a new challenge. His only regret was that he hadn't been the one to lead the way thus far. ESI had beaten him to the job.

Unlocking Europa's frozen mysteries was an astounding feat of engineering. ESI had had to find a way to penetrate ten kilometers of ice, and then travel up and down that distance. Time, technology, and a great deal of money had solved the first problem. ESI had drilled and blasted a shaft twenty meters wide, all the way through Europa's ice crust until they'd struck water. The shaft was capped by a dome, heated, and pressurized, so

Europa's ocean wouldn't boil and flash-freeze like it did when exposed to the cold vacuum of space.

Nature had solved the second problem. The same huge tides that caused Europa's shell to crack caused the water level to rise and fall in the shaft. By controlling valves, the crew could regulate how much water flowed in or out of the shaft. At high tide the crew allowed the water to climb to the surface, where the *Vostok* could be deployed. At low tide the water level subsided several kilometers, leaving a deep hole in the center of the dome. Interactions with Io, Ganymede and Callisto made tides irregular, but computer models generated tide charts for the crew. The cycle generally lasted about three-and-a-half days, the length of the European year. Each year the water level was high enough to launch or retrieve the submersible for about twelve hours.

For the first ten kilometers of the descent, Elliot saw nothing but the walls of the shaft. Then he passed the massive valves used to regulate the water flow, and suddenly he was free, suspended in the endless black of Europa's ocean. The floodlights cut into the darkness, illuminating rising bubbles and bits of flotsam.

Alice switched off the exterior lights. She wore a bright grin.

Elliot liked her. She was attractive-blond, a stunning body accentuated by the form-fitting heatsuit, charming gray eyes and an irresistible Aussie accent-but what he respected most was her obvious passion for Europa. Her enthusiasm was contagious.

"This is incredible," he whispered, staring outside the bubble.

"You haven't seen anything yet. Wait until we get to the vents on the seafloor."

"How many have you found?"

"Three with life, each ecosystem different from the next. Complex life can't survive in the cold water long enough to drift from one vent to another, so each vent has followed its own evolutionary path. We've found twelve more vents without life."

Alice toggled a switch and released the manual controls. "The autopilot will take us to the first vent. Make yourself comfortable, the descent will take about two hours."

Alice leaned back in her chair and clasped her hands behind her head. She was in her element down here, Elliot knew, with the deep cold black pressing on all sides.

He leaned forward to peer out the transparent bubble, but after a few minutes of seeing only pitch blackness he decided to follow Alice's example and recline in his chair. He listened to the tortured creaking of metal as the ocean's pressure squeezed down on the *Vostok's* hull, and stared out at the empty darkness.

Europa, he thought, would make a formidable opponent.

When the sub was a kilometer above the seafloor, Alice switched on the passive sonar. Colorful streams of blue and green filled the waterfall display, representing external sounds. Her time below was rare, so she felt a deep thrill rippling through her senses each time she approached the seafloor.

In her excitement she almost forgot about Scott. Almost, but not quite.

"Listen," Alice said, focusing her attention on Europa as she rotated a dial beneath the display. A cursor aligned on a bright splotch of blue. Speakers crackled and the roar of gurgling water filled the cabin.

"Is that a hydrothermal vent?"

"Yes, we call this one Smokestack. It's coming up ahead." She switched off the autopilot and flipped on the floodlights. The black void beneath them became an eerie yellow landscape of rock.

"Sixty meters," Alice read off the sonar screen. Landon leaned forward in his seat, gripping the console. "Forty. Twenty. There's the plume." A black, billowing pillar of heated water streamed upward from the seafloor ahead. As they drew closer dozens of silver objects flared into existence, reflecting the light of *Vostok's* beams. They danced about the plume like fireflies, caught in a swirling fluid pattern of movement.

"Good God," Landon whispered. He pressed his fingers and face against the glass. "What are they?"

"We don't have a formal name for them yet; unofficially, we call them glowworms. They feed on bacteria, which in turn feed on sulfuric compounds from the vent. This vent has an entire ecosystem, though most of it is too small to see."

"They evolved here?"

"Yes. As far as we can tell, all the life on Europa is homegrown." Alice glanced sidelong at him. "That's why it's so important we protect Europa. We've only explored a tiny piece of Europa's seafloor, so there's no telling what other secrets she might be hiding. It's an awfully big ocean."

Alice stabilized the sub ten meters away from the vent. All the vent's hot water was directed upward. Even this close to the scalding plume, the water temperature was subzero. The high pressure and high mineral concentration made such frigid temperatures possible. No life could survive in water this cold, so an invisible thermal barrier separated *Vostok* from the fragile ecosystem.

As Alice stared at the beauty she realized, down inside, Scott was right. Though she hadn't betrayed him to Pascal, she had never committed herself to him either. Her heart was here, in the cold European deep. It always had been.

She grimaced as she switched on the comm system. She didn't want to confront Scott right now, but he was expecting her call. "Deck, *Vostok* here. We're at Smokestack."

Pauline Simona, the senior geologist, appeared in the communications screen on her console. "*Hey Alice. Scott went EVA, he'll be back in a little while.*" Alice breathed a sigh of relief. "*Do you want to leave him a message?*"

"Just let him know we're here. He can call later if he wants."

"*Okay, will do. Have fun down Pascal! What the hell are you--*" Pauline dissolved into a blur of static.

Landon frowned. "What happened?"

"I don't know. Let me try the backup." She switched the system over.

"*--hell is going on? Vostok, Vostok, come in!*"

"Pauline!" Alice shouted. "What's going on?"

"*It's Pascal! He "*

An explosion roared over the radio. The audio dissolved into piercing static. The screen turned blue and displayed the words NO SIGNAL.

"Pauline!" Alice cried. She tried alternate frequencies and different settings while she repeated the call, but she got no response.

“What’s going on up there?” Landon asked after several minutes of futile attempts to raise the Deck. “Is this-usual?”

“No, it’s not.” There was no sense lying.

Pauline had been shouting something at Pascal. The bastard had *done* something, but what? She thought of their conversation on the ice last night, and Pascal’s haunting words echoed through her mind. *Consider yourself warned, Alice. If you won’t do something about this, I will.*

Why hadn’t she told Scott? She’d been so angry when he confronted her that she forgot about the warning entirely. Now she wanted to talk to him, but without the radio she was alone; alone with Elliot Landon, Europa’s worst enemy. Great.

“I’m taking us back to the surface. I hate to cut your tour short, but I don’t like being out of touch with the Deck.”

That was partly true, but her real reasons for wanting to surface were more personal. She had left the Deck on angry terms with Scott. What if something happened down at the seafloor? When she got back to the Deck she would sit down with him and patch things up. After eleven years together, they’d had plenty of practice.

Landon stroked the bubble window with his fingertips, as if trying to caress the glittering worms. He looked disappointed, but he said, “I understand. This one glimpse was worth coming to Europa.”

That brought a smile to Alice’s lips. Europa never left a person unchanged.

“I don’t know what Pascal did,” she said as she blew the *Vostok’s* tanks, “but I’m sorry he ruined your visit. Try not to let his actions influence your perceptions of ESI.”

Inwardly, she seethed. After this stunt, it would be a miracle if Greaves-Kaplan let ESI stay. What was Pascal hoping to accomplish by pissing off one of the most powerful men in the corporation? A corporation ESI depended on for survival?

“It’s not your fault. Thank you for showing me the vent.”

She glanced over at him. He had turned away from her, chin in hand. He seemed lost in thought.

“We’re still picking up a steady transponder signal from the Subdeck, on the bottom side of the ice shell,” she said, more to herself than to him. “The communications fault must be topside.”

It took an hour and a half to ascend back to the shell. Alice grew more and more worried with the passage of time. She expected the Deck to reestablish contact somewhere along the way, but *Vostok’s* radio broadcast only static. By the time they neared the ice shell, her hands were shaking and her mouth was dry.

Alice took manual control as they approached the ice. A metal platform appeared in the hazy water when she switched on the external lights. “The Subdeck looks intact,” she said, leaning forward as she peered at the structure. “I’m taking us around to the drop shaft, it’s right over-” she trailed off into silence as the *Vostok* rounded the Subdeck.

Where the hole in the ice should have been, there was nothing but a jagged icy surface. “It’s frozen,” Alice whispered, knots of fear welling up in her stomach. “The hole is frozen over!”

Elliot’s face betrayed no emotion. His hand went to his chin, as if he were pondering an unexpected move in a game of chess.

The sub drifted to one side, Alice's controls forgotten. "That's not possible," she muttered. "What the hell happened up there?"

The fear was swirling, choking. Alice couldn't see straight. "Eight hours until the ascent window closes. That gives us time."

"Time for what?"

Alice didn't answer.

She had dived in submersibles her entire life, from her earliest undergraduate days to the present. She had never been afraid of submersibles, never suffered from claustrophobia, but now she felt the spherical walls of the *Vostok* closing in on her.

The *Vostok* was an undersea womb, capable of protecting them against the elements for as long as four days-if it was fully stocked with oxygen and energy. With two dead batteries, *Vostok's* lifetime would be shortened dramatically, but the next launch window wouldn't open for three-and-a-half days.

A burst of static from the cabin speakers interrupted Alice's speculations. "*Vostok, this is Deck. Come in.*"

Alice scrambled to switch on the cabin transmitter. "Pauline! The drop shaft is frozen over!"

The comm screen flickered on and Pauline's face appeared. Her face was streaked with oil, her hair disheveled. She looked as if she'd been crying. "*It's bad, Alice. Pascal ruptured the shaft dome.*"

"No!" Alice imagined the scene. With the positive pressure removed, the water in the drop shaft would have boiled away. At the same time, the water beneath would have flash-frozen. The evaporation and freezing would have continued until a solid layer had

formed. The ice would then get thicker with time. It was the same process that formed the beautiful and terrible *flexi*.

Pauline fought tears as she went on. *“Alice, there’s more. Scott was in the dome when Pascal ruptured it. He’s alive, barely, in a coma.”*

Alice’s mind reeled. Hot tears stung her eyes. Oh God, no, this couldn’t be happening, no, no, not Scott, not after last night.

Pauline wiped tears on her sleeve. *“Dennis caught Pascal and locked him in the airlock.”*

“Oh God,” Alice kept repeating, her world spinning around her. Beside her, Landon had paled. “How bad is the damage to the Deck?” Alice asked. “Is the ascent vehicle still intact?”

“The Deck is in bad shape. We can keep things running for a few days, maybe even a couple weeks, but the mission’s over. Fortunately, Dennis says the damage to the ascent vehicle is repairable. We should be able to launch within two days and evacuate to Ganymede.” She took a deep breath. *“But the drop shaft Dennis and Nikolai are out there right now, looking at the damage. We’ll do everything we can to open up a hole, but ”*

Alice raised a hand to the camera to quiet her. “I understand,” she whispered, choking on the words. She looked down at her instruments. “Pauline, it’s obvious we’re not surfacing during this window. I’m taking us down to the seafloor to wait for the next window to open. We’ll shut everything down except life support and wait it out. To

conserve power everything-radios included-is going down. I'll listen for five minutes every four hours, starting at 1200, so if you need to get in touch, broadcast then."

Pauline's lip quivered. *"I understand. We'll be working day and night for you two."*

"I know you will. I'm powering down now. Good luck, Pauline."

"Good luck, Alice. You too, Elliot."

Alice switched the radio off. She looked at Elliot, who wore a rigid, calculating expression. He did not look like a man who was accustomed to defeat.

"We'll fight this out," she whispered, in spite of her own fear. He nodded wordlessly.

Alice flooded the ballast tanks. The *Vostok* began to sink into the cold, deep darkness.

III.

"We'll die down here, won't we?"

It was the first Elliot had spoken in the last six hours. He sat beside Alice in the darkness, huddled beneath emergency blankets. Alice had turned the heaters off to conserve power. Frost was already accumulating on the cabin's aluminum surfaces. Alice's hair and eyebrows were brittle with ice crystals.

Alice sighed heavily. "Probably."

She shivered in the dark and wrapped her blankets tighter. She listened to the creaking and groaning from the pressure on the *Vostok's* hull. Though Elliot sat mere inches from her, the darkness separated them like a curtain. Could she stand this for three

days? Would they die when their oxygen and power reserves ran out, or would they go mad long before that?

Scott or Europa. Europa or Scott. She had made her choice years ago, on the snowy plains of Antarctica, when Europa was still a distant goal. She had chosen this hostile frozen nightmare. Now she just wanted Scott. If she could see him one more time, just long enough to apologize, she would die in peace.

Elliot apparently wrestled with his own demons in the dark. "I've spent my whole life battling nature," he said at some point during the first night. "I don't know why I do it, but I have to. Antarctica, Everest, Mars, Ganymede. It's why I joined Greaves-Kaplan. When I'd faced the best Earth could offer I had nowhere to go but up, to new frontiers. Each frontier was so new and different, but I've always conquered. I've never lost."

He was definitely an intellectual, Alice thought as she tried to force thoughts of Scott away. Not very sensitive, though. "Until now?"

He sighed. "Checkmate in one. How will it end? Asphyxiation? Freezing?"

Alice leaned forward, her body protesting, and switched on her console. Flickering red lights illuminated the cabin. The sight of another human face brought a tremendous feeling of comfort, although Elliot looked like a devil in the red glow.

"What are you doing?" he asked, his breath rising in white billows.

"Answering your question." She checked several readings. When she was finished she switched off the computer and withdrew back into her blankets.

"Well?"

"Oxygen should last four days, but power doesn't look so good. We might be able to stretch it for three days."

“What’s that mean for us?”

“No power, no heaters.”

Elliot didn’t ask any more questions.

Two-and-a-half days had passed.

The batteries in Alice’s heatsuit had died after the first eight hours, so she’d reluctantly activated the cabin heaters. She kept the submersible subzero to conserve power, but it was warm enough to keep them alive. It felt too cold to move, too cold to talk. She and Elliot agreed to rotate their sleeping schedules. One of the two was always awake, to rouse the other after the sleeping period was over. Otherwise, they might never wake up.

They lay on the floor behind the chairs, bodies pressed tightly together, wrapped in the thin heat-reflective emergency blankets. There was nothing romantic about the arrangement. The hours passed in cold, stiff, aching silence. They spoke little. Every few hours they drank water and nibbled at emergency rations.

Late on the third day Elliot’s weak, shaking voice stirred Alice from delirium. His teeth chattered violently as he strained to formulate syllables. “C-colder. G-getting c-c-colder.”

Her senses were too numb to notice the change, but he might be right. She fumbled under the blankets for the flashlight and switched it on. Glazed, frosted surfaces sparkled where the beam landed.

Alice's hands shook so badly she could barely grip the flashlight, but somehow she managed to sweep the beam around. It lighted on a thermometer on the port bulkhead. The mercury had fallen ten degrees.

The batteries were dying.

"Checkmate?"

"Yes."

Long silence. Elliot shifted beside her. Where his body lost contact with hers, she felt the sharp bite of frigid air. He whispered, "The v-vents-how warm?"

"Th-three hundred-or so."

"Warm."

It took a moment for her dulled mind to grasp what he was saying, then she understood. She felt a glimmer of hope inside, but horror and panic swept it away. "We're near-Smokestack. No power to reach-anywhere else. The I-life. W-we'd kill it."

Only Elliot's chattering teeth answered her.

God, Alice thought, was it possible? Could they extend their lives? No! It would mean the death of an entire ecosystem, small as it might be. It would be genocide. But she had to see Scott again. She couldn't die like this, not after the words they had exchanged before the dive.

It was getting colder, and Alice felt too numb to think. In a few minutes she had forgotten the conversation, and was lost again in delirium.

Cold so damn cold and oh my god I'm going to die. Scott where are you Scott don't let me die I don't want to die here. Not like this don't let me die oh my god oh my god oh my god. So cold I can't breathe and where is my body I can't feel it anymore. Why is Europa doing this she's killing me and it's so cold so cold so cold. I'm sorry Scott I'm so so sorry. I don't want to hurt Europa but it's for you Scott and oh my god it's so cold, so cold...

Elliot had been dreaming, but when he awoke all he could remember was a feeling of profound terror. He had broken into a sweat, and the moisture had frozen to his face and body. When he stretched and contracted the muscles in his face a thin crust of ice cracked and splintered. Each breath felt like fire scorching his lungs. He had no feeling anywhere else in his body.

The end was coming. Within the hour. After so many years of these grueling matches with nature, nature had won. Checkmate.

A terrible blast of cold struck his entire body at once, and he tried to scream. Only a faint gurgle emerged. He reached with limp arms and realized Alice was gone. The flashlight was there, but his hands didn't work. He fumbled for seconds, minutes, but couldn't switch it on. He lay still, exhausted by the effort.

A new sound reached his ears: the hum of electricity. Red console lights sputtered into reluctant existence. Alice lay draped over the console, hair matted with ice, fingers blackened. The way she moved, the tone of her flesh, gave her the appearance of an animated cadaver. Her hands went to the controls.

A cry of warning resonated through Elliot's delirium. She was going to do it. She was going to take the game into her own hands. He should stop her. What she was doing was akin to reaching across the board and toppling the enemy king with the back of her hand.

But something more powerful stifled the voice. He realized that, despite what he'd told himself for years, he was afraid to die. Though his mind protested, told him to stop her, he lay shaking on the floor.

He felt the vibrations of the *Vostok's* engines. As the submersible crept forward he saw the black plume of Smokestack drawing nearer. The little glowworms glittered in the *Vostok's* light, closer, closer, closer.

Then the *Vostok* was inside the plume, scattering the alien creatures into the frigid darkness. The delicate ecosystem was displaced only a few meters, but the creatures would freeze and die within seconds.

Alice had broken the rules, but she could be excused; she was not in this for the challenge of the game. Elliot knew better, and he had allowed her to cheat anyway. Every opponent he had ever defeated played fair, but now, when it was his turn for defeat, he'd overturned the game.

Elliot found tears welling in his eyes. Before he could wipe them away, they froze in place.

IV.

Alice wanted to die.

The pain as her body thawed was so excruciating that she thought she might. It felt as though someone held open flames against her body, starting with her fingers and toes and nose, working inward to her legs and arms and face, and finally igniting her torso. By the time the pain struck her chest she was writhing and sobbing on the *Vostok's* floor. Elliot groaned beside her. She had killed all the electricity again, once she was parked in the vent, so they were still in darkness.

She lost all sense of time and place as the pain of her thawing body tore her sanity to shreds.

Sometime later she awoke, aching and exhausted, dripping with sweat. The fire was gone. Her hands found the flashlight and switched it on. Streams of water dribbled down the cabin walls. Elliot was crumpled in the right chair. He wasn't conscious, but he was breathing. Alice saw three of her fingers were black with frostbite. The heat in the cabin was sweltering.

She sat down in the pilot's chair and checked the computer. Almost three-and-a-half days had passed. Four more hours before the ascent window opened. One of her scheduled communication times was due in eight minutes.

Alice suddenly stopped to ask herself how it was that she was alive. Then, in an explosion of devastating emotion, she remembered what had happened.

She flipped on the floodlights, hoping it wasn't true. The lights showed streams of bubbles racing up past the glass, as if she were behind an upside-down waterfall. Alice's heart caught in her throat. She leaned forward and tapped a finger against the glass. "Ouch!" She snapped her burnt hand back and sank down into her chair. She'd done it.

To save herself, in the hope that she would see Scott again, she had destroyed an entire alien ecosystem.

And for what? What chance of rescue could there be? Hadn't she just delayed the inevitable?

She checked over the *Vostok's* systems. The vent had warmed the batteries, giving them a little extra juice. It would be enough to power the radio and maybe drive the engines for a short while. She could say her goodbyes, then.

When the eight minutes had passed she switched on the radio. "Deck, *Vostok*. Come in." Only static. "Deck, *Vostok*. Come in." More static.

Then, much to her surprise, a voice burst through the static. "*Alice! Is that you?*"

"Dennis!"

"Thank God, you're still there! We thought we thought "

"How's Scott?"

"He's still in a coma, but he's stabilized. We think he'll make it. But what about you? What happened?"

"We're-we're parked on top of a hydrothermal vent for heat." No need to tell him which one. "We have about twelve hours of oxygen left, and power's almost gone. How are things topside?"

The enthusiasm in Dennis' voice faded. "*There's no hope of reopening the shaft in time. The ice is too thick.*"

"Dennis, I'm going to surface near Subdeck. That way, if ESI ever opens the drop shaft again, they can find us. Also, I need you to tell Scott something when he wakes."

"Anything, Alice."

“Tell him I’m sorry and I hope he’ll forgive me. Tell him I choose him.” She looked at Elliot, still unconscious beside her. Then she looked out the glass at the scalding water of the vent rushing past. “Tell him that Greaves-Kaplan can come. Europa is no longer under our protection.”

“Alice, I don’t understand ”

“Just tell him, Dennis.”

Silence ensued. *“I’ll tell him. Is is this goodbye then?”*

“I’m sorry, Dennis. You’re in charge now. Evacuate the rest of the crew.”

She switched off the radio before he could answer. She hated goodbyes.

“Alice, look at the sonar!”

Elliot gripped her shoulder and pointed at the display. They had been ascending for close to an hour, and Alice had been drifting in and out of sleep.

She jerked upright in her chair when she saw the display. A sharp red crescent filled one quarter. She rotated the dial to line the cursor up on the red. Grinding, splintering noises filled the cabin. Elliot stiffened and gripped the arms of his chair. Alice winced. It sounded like the submersible was deforming and fracturing around her.

“What is it?” Elliot shouted above the noise.

Alice turned down the volume. Her hand trembled on the knob. She had an idea. “Ice! Europa’s ice shell is fracturing!” She fumbled for the radio. “Deck, *Vostok*, come in!”

Dennis answered. *“Deck here. Glad to hear your voice again, Alice.”*

“Dennis, I need you to check the seismographs. We’re picking up a fracture on the sonar. What can you tell me about it?”

“Hang on, let me grab Pauline.” A minute later both their faces appeared in the screen. Pauline said, *“It’s a big one, Alice, two kilometers wide. It’s creeping across the surface with the tide. Looks like it will pass about six kilometers from the Deck. Damn, that’s close.”*

Alice exchanged looks with Elliot. His eyes widened and he shook his head. She gave him a mad grin as she keyed the radio again. “Listen carefully, Dennis. This is going to be tricky.”

Elliot sat rigid while Alice worked the sub’s controls. After these three-and-a-half agonizing days below Europa’s surface, he had come to recognize that this moon was not his domain. He had conquered the ice in many other places, but not Europa. If he relied on his own resourcefulness, Europa would kill him without a second thought.

But Alice—Alice had the power to tame Europa. While Elliot had been moving from one challenge to the next, leaving each conquered victim behind, Alice had patiently and devotedly poured herself into the study of this one frozen moon. She knew Europa like no other. She loved it, nurtured it, protected it; but when she had to, she could fight it with ruthless skill. Elliot had seen that on the seafloor, when she’d parked in the vent. Now he was seeing it again.

This frozen moon had defeated Elliot Landon. Now it was Alice Sansight’s turn to try conquering Europa.

Alice drove the sub toward the advancing crack with steady calm. The water was alive and turbulent around them, buffeting them, spinning them, pressing them hard into their seats and then lifting them in momentary weightlessness. Sweat poured down Alice's face and matted her hair to her forehead as she fought the controls. Her eyes didn't waver from the bubble.

"Two hundred meters," Elliot read off the waterfall display. The roar of ripping, shattering ice was deafening.

Elliot gripped his console as the submersible pitched forward 90 degrees, rolled to one side, then rocked back upright.

"One hundred meters."

Suddenly Elliot felt the force of several gees pressing him into his chair. He lost all sense of direction as the *Vostok* swung madly about on all three axes. Water and ice rushed past the bubble. "We're caught up in it!" Alice shouted. "Hang on!"

Elliot already held the arms of his chair in a death grip. He closed his eyes to shut out the spinning chaos as the *Vostok* was sucked upward through the crack. Metal groaned and creaked around him. Ice sputtered, roared.

Elliot lost all sense of time. He knew only the confusion, the disorientation, the sense of speed as the submersible shot upward, banging against the icy walls of the fissure. Unexpectedly, all at once, the sound of ice and water died. Elliot opened his eyes. He saw ice and star-littered space rotating through the bubble. Jupiter sped past his field of view in an orange blur. He had a dizzying sense of altitude before the submersible pitched over, and he saw Europa's wasted surface far beneath him. Water sprayed up

around them, evaporating into wisps and freezing into huge waves of blue ice. Then he was plummeting down toward the surface again, caught up in the spray.

When at last it was all over, *Vostok* was embedded in a crystalline tower of ice. They had settled at an angle, so Elliot found himself pressed up against the right bulkhead. Alice's long hair dangled close to his face. They were both gasping for breath.

The left side of the submersible was frozen into the icy cliff, but the view to the right was unhindered. In the distance Elliot saw the Deck, and the blackened ruins of the dome. A plume of ice rose at least two hundred meters above the dome's remains, like a crystal flower.

Then he spotted something that made him laugh out loud. A pressurized six-wheeled tractor was rolling toward them from the direction of the Deck.

Sixteen hours later Alice stood beside the airlock on the utility deck, watching as each of the crewmen filed through. She was so exhausted from the events of the past four days that she could barely stand.

A person-sized air hose connected the Deck's airlock to the ascent vehicle. Dennis was already on board running through pre-takeoff checklists. Now the remaining crewmen were boarding, bringing whatever equipment and research data that they could. In two hours they would be gone.

She should be happy to be alive—she had looked death in the face, had confronted all the awesome terror of Europa, and won—but she felt only sickness and guilt. To save herself, she had defiled the fragile moon she had sworn to protect. ESI was supposed to be different from corporations like Greaves-Kaplan, dedicated to Europa's preservation. What

was ESI now, but a society of hypocrites? She had done it for Scott-she had made her choice-but that didn't lessen the guilt of betrayal. She would murder a world to save her life and her relationship. Pascal would take lives to save a world. Were they any different than Greaves-Kaplan?

Two crewmen approached carrying Scott on a stretcher. He would live, the doctor had told her, but he would probably remain comatose for two or three more days. There had been brain damage. When he did finally awake, he would face a long, slow recovery. It could take years. He would need her more than ever now. She brushed his cheek with her hand as the crewmen carried him past.

Pascal came next, hands tied behind his back with duct tape. Nikolai followed him warily. "Stop," she ordered Pascal. He stopped walking, but avoided meeting her eyes. "We'll deal with your attempted murder when we get to Ganymede. I promise, I will destroy you." She searched his face. "For now I just want to tell you something. Look at me." When he refused, she grabbed his chin and yanked his face toward hers. "I'm telling ESI to let Greaves-Kaplan come."

"What!"

"All you've done is prove that ESI is not the mature body we would like her to be. You brought murder and destruction to Europa. So did I. We had our motives, but that doesn't excuse what we did. What right do we have to stop Greaves-Kaplan from coming? How can we judge them?"

He glowered at her. "If you let them come, all this is for nothing."

"Get out of here." She shoved him in the back. He stumbled forward in the light gravity, through the airlock. Nikolai followed after him.

Alice watched the rest of the crew go through before boarding. Dennis helped her seal the airlock and detach the hose. Then she went to find a seat near where Scott's stretcher was secured. She wanted to be there when he woke up. She owed him an apology.

Elliot sat by himself in the back of the cabin.

He watched through a portal as the brilliant white ice slipped away. The Deck grew smaller and smaller, until it was only a point of silver, then it was gone entirely. Long after it had vanished he could still see the arc of the newly formed fracture. The bluffs of ice cast long shadows on Europa's surface.

Elliot sighed and waved goodbye to the world he could never forget. Europa, the world that had conquered him.

Part of him wanted to come back someday, to try again. His wounded pride demanded a rematch, a second chance to prove that he could best this world; but he wouldn't. Europa had defeated him. Alice had played her last desperate move at Smokestack, but even that wasn't enough to save their lives, only to prolong them a few hours. Elliot should have died, but Europa had let him go.

The world had toyed with them, let them suffer, let them come to the brink of death so they would know they were defeated. Then, in an act of unfathomable mercy, she had vomited them to the surface. Even though they had taken the lives of the Europeans at Smokestack, Europa had given them their own lives back. Elliot could come back and fight another battle if he really wished to, but Europa had made her meaning clear. She owned Elliot's life. He owed his continued existence to her mercy.

No more matches with Europa, Elliot knew. He would not return. Someday, perhaps, Europa would extend the invitation and then he might come. But until that day, until Europa somehow emerged from the safety of her icy walls and welcomed humanity back, he would respect her superiority and stay away.

Greaves-Kaplan would not come to Europa. Nobody would. He would make sure of it.