

Ex Vitro

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With a few short story sales to *Asimov's*, *F&SF*, and *SF Age*, Daniel Marcus has made a sharp splash in the science fiction field. His hard-hitting tales landed him on this year's John W. Campbell ballot for Best New Writer, but Mr. Marcus isn't resting. His powerful new story takes a brutal look at life on a research station millions of miles from home.

I

The communications room was a weird place. Jax wanted to hunch his shoulders against the close metal walls, against the silent machines that smelled faintly of ozone and heat. An array of yellow telltales glowed steadily on the panel over his head; the blank, grey screen hung before him like an open mouth. The one decoration in the barren cubicle was a software ad-fax Maddy had taped to the wall—INSTANT ACCESS, some sort of file-retrieval utility, the first word highlighted in blue and the letters slanted, trailing comb-like filigrees denoting speed.

There was something that drew him to the place, though, and he caught solitary time there whenever he could. He imagined himself a point of light on the far tip of a rocky promontory, a beacon rising above a dark, endless ocean.

Jax heard a sound behind him and turned around. Maddy stood in the doorway. She had been working out, and her shirt was damp with sweat. Ringlets of dark hair framed her face; red splotches stood out high on her pale cheeks.

"What's up?" she asked, still a little short of breath. "I didn't hear a comm bell..."

"Nothing," Jax replied. "I'm just hanging. Fog's really bad—we can't even watch the slugs."

Maddy shrugged. The slugs didn't interest her much—anything that happened on time-scales shorter than a thousand millennia slid under her radar. Titan itself, though, was to her like a blood-glittering, faceted ruby to a gemologist. Ammonia seas, vast lava fields laced with veins of waxy, frozen hydrocarbons. She was taking ultrasound readings to map the moon's crust and mantle. Jax had never seen her so engaged, but the news from home was like a tidal force pulling at her from another direction. "Anything new on the laser feed?" she asked.

Jax knew that, decoded, the question was, "War news?" Or more specifically, "How bad does it have to get before we can go home?"

She had family in the EC, in Paris, and the information that came in on the feed was frustrating in what it withheld. It was like deducing the shape and texture of an object by studying the shadow it cast in bright, white light.

They did know that a couple of days ago, PacRim had lobbed a mini-nuke at one of the EC's factory-continent in the Indian Ocean, claiming a territorial incursion. The EC had followed suit by vaporizing Jakarta. There had been some sporadic ground combat in New Zealand and Antarctica and a lot of saber-rattling, but no further nuclear exchanges. The North American Free Trade Coalition and the Russian Hegemony were sitting back and waiting, urging restraint and dialogue in the emergency League session and keeping ground and space defenses at full alert.

"PacRim's been making noises about a nova bomb, but nobody really thinks they're *that* crazy. Naft's warning everybody off their wind farms in the South Atlantic—that's not exactly news, not since Johannesburg." Jax shook his head. "The Net's going completely apeshit, of course. Traffic volume's sky high..."

She took a step toward him and he stood up and put his arms around her. They stood like that for several minutes, their breathing merging slowly to unison. She smelled of sweat and of the hydroponics media she had been working with earlier that morning. The taut, lean muscles of her back relaxed to a yielding firmness under his hands. She began to move against him, and she gently pushed him back into the chair.

"Wait," he said. "Not here. Let's go to the pod."

Maddy nodded without speaking and turned around, reaching behind her back for his hand. He took it and trailed her down the narrow corridor. They passed other passageways branching off, leading to sleeping quarters, the galley, the labs. At the end of the corridor, standing like an abstract sculpture, was a gleaming, twisted piece of obsidian Maddy had brought in from one of Titan's lava plains. Oxidation from the station's atmosphere gave its surface a rainbow sheen. A rude step was carved into its side with a hand laser. Above it was a round, open hatch. Maddy let go of his hand, stepped up onto the rock, and pulled herself through. Jax followed behind her, emerging into a crystalline bubble surrounded by a sea of swirling mist.

They had grown the pod from a single crystal into a transparent, 5-meter hemisphere. It was light and thin, but strong enough to keep out the deadly hydrocarbon brew that was Titan's atmosphere. The fog was beginning to thin a little, and through it Jax could see the frozen landscape glittering in tenebrous, diffuse light. He caught a glimpse of a herd of slugs on the shore of the nearby ammonia sea. Their shiny, chitinous bodies were scattered across the lava beach in a rough pattern, like sheared concentric diamonds, slowly shifting.

Maddy had already taken her clothes off, and she stood facing him, waiting. Jax stepped out of his shorts and put his arms around her again. They stood there, rocking slowly, then together they sank to the carpeted floor.

When Maddy came, a shuddering ripple passed unseen through the pattern made by the slugs' bodies. Jax's pleasure shortly afterward sent another wave passing through the pattern from the opposite side. The ripples collided and scattered, each leaving an imprint of its shape on the other.

Jax gently disentangled himself from Maddy, trying not to wake her. She groaned softly once and rolled over, then her breathing returned to normal. Her face was relaxed and completely expressionless, as if sleep were a black hole from which nothing of herself escaped.

For an instant, it looked to Jax like the face of a perfect stranger, its contours so achingly familiar that the familiarity itself was something

exotic. He reached out to touch her, and his hand hovered above the curve of her cheek, trembling slightly.

So strange, he thought, the two of us out here, middle of nowhere, ties to home nothing more than electromagnetic ephemera. Ghosts. What *are* we to each other in the absence of context? We create our own, always have.

They'd met when they were graduate students at the Sorbonne, Maddy in planetary physics, Jax in system dynamics. They were both driven to succeed, the shining stars in their respective departments' firmament of hopeful students, and they gravitated toward one another with the same intensity that fueled their research.

They cycled through several iterations of crash and burn, learning each other's boundaries, before they settled into a kind of steady state. Still, their relationship felt to Jax like a living entity, a nonlinear filter whose response to stimuli was never quite what you thought it was going to be.

Individually, they were excellent candidates for SunGroup, a system-wide industrial development consortium—mining, Pharmaceuticals, SP-sats, all supported by a broad base of research and exploration. As a couple they were perfect for one of Sun's elite research teams. When they finished out their three-year term, especially if they had "made their bones" by discovering something of interest and potential profit, they would have enough clout in SunGroup to command their own programs.

The slugs were certainly of interest. They were at the apex of Titan's spartan ecosystem—black, almost featureless bullet-shaped creatures about the size of dogs. Methane-breathers, they basked in the shallows of Titan's ammonia seas and fed on anything organic—the primitive lichen that grew in sporadic patches on the moon's rough surface, the glittering chunks of hydrocarbon ice scattered like moraine across the landscape, even each other.

Jax could watch them for hours. They exhibited behavior not unlike schooling or flocking, merging in geometric clusters, shifting, forming new patterns. Individually, they seemed less sensate than bees; their central nervous system consisted of nothing more than a small knot of ganglia at the wider end, where there was a cluster of light-sensitive vision patches. They were living cellular automata—each responding only to

nearest-neighbor stimuli. Collectively, though, from the local interactions, there emerged a complex, evolving pattern.

The fog was thick again, a uniform shroud. It seemed to glow with a dim, pearly light of its own. Jax wondered about the slugs outside, what they were doing. He closed his eyes and in that darkness he imagined a slowly shifting pattern of glowing points, an elongated oval surrounding a hard, geometric figure of sharp edges and straight lines.

II

Maddy took another leaf from the small pile of lettuce in the colander and put it in her mouth. The taste was so bittersweet *green*, so substantial and earthy, that it brought tears to her eyes.

"The new crop of lettuce is really good," she said. "I think I finally got the 'ponics chemistry down."

"About time," Jax said. He looked up from the catfish he was cleaning. Fresh from the tank-farm, its bright organs spilled out on the cutting board. Blood streaked his hands and the smell of it was strong and sharp in the little galley. "The last batch had that weird, rotten aftertaste. I kept waiting for the cramps to start."

"Well, *fuck* you, then." The words seemed to materialize in the air between them, as if they had come from somewhere separate from her. She felt color rising to her cheeks, but there was no place to go but forward. "Anytime you want the job, you just say so."

Jax looked startled and hurt. He wiped his cheek, leaving a bloody streak, and bent down to his work again. His large hands were quick and sure. Maddy could feel the tension between them like a third presence in the room. She took a deep breath and let it out. Again. In, I calm my body. Out, dwelling in the present moment. In, listen, listen. Out, the sound of my breathing brings me back to my true self.

She took a step toward him and put her hand on his arm. He looked up. She kissed his cheek, tasting blood.

"I'm sorry, baby," she said. "I'm a little wired out with the war news. I can't take much more of it." She bit her lip. "If it gets any worse, I'm going to want Sun to pull us out of here. I need to be near my parents."

"Jesus, Maddy, Paris is the last place we want to be if the shit really hits the fan—it'll go up in a puff of plasma." He paused when he saw the expression on her face and reached out to touch her arm. "I'm sorry, but you know it's true. Do you really want to move to Ground Zero?" He let his arm fall again. "Besides, if we abort, they'll nail us with a stiff fine and we'll never get them to back us again."

"We can afford it."

Jax shrugged. "We can afford the fine, yeah, but we'd have to start from scratch with another Group, and that wouldn't be easy."

"Maurice will swing it for us." Maurice Enza was their sponsor at SunGroup. A hundred-thirty-two years old, mostly cybernetic prosthetics including eyes and voicebox, still publishing in the theoretical bio-economics literature. Maddy revered him. Jax respected him, but privately thought he was something of a spook and had always kept him at a polite distance.

"Maurice may be as old as Elvis but he isn't God."

Maddy closed her eyes. In, I calm my body. Out, listen, listen.

She opened her eyes and looked closely at him. His face was open and earnest. He wasn't just being an asshole or doing some kind of power thing.

Maddy smiled gently. "Let's just see what happens, okay?"

The catfish was delicious, its flesh moist and white, the Cajun-style crust black and redolent with spice. The lettuce tasted sweeter with the fact that she had grown it with her own hands, nursed from a rack of seedlings in a carefully tended nutrient bath to full, leafy plants, their tangled roots weaving through their bed of saturated foam.

They ate together in silence. A Bach violin concerto played softly on the lounge speakers, the melodic lines arching gracefully over the muted hum of the life support systems.

Strange to be so connected with the sensate, Maddy thought, these earthy pleasures, while we're in this tin can at the bottom of an ocean of freezing poison, a billion and a half clicks from most of the people I love. Where everything's falling apart. Listening to Bach, no less.

She shook her head. Cognitive dissonance.

Jax looked over at her and smiled. "What?"

"Oh, nothing, I... I don't know." She held her hands out in front of her, palms up, as if she were gauging the weight of an invisible package.

The veined rock flashed by her in a grey, flickering blur. Every now and then, she emerged into an open space for an instant and caught a brief glimpse of distant walls, stalactites and stalagmites merging in midair to form complex, bulbous shapes, ghostly green in the enhanced infrared. Then the bottom wall would rush up and swallow her again. A readout on the display in the lower left corner of her vision flashed her depth below the surface.

Maddy saw a fault open up off to her left and she steered her way over to it by opening the right-hand throttle of her jetpack, a bit of Buck Rogers kitsch she'd coded up to contextualize the virtual a bit, give it some tactile reference. Too easy to get disoriented otherwise—sim-sick.

She followed the fault down toward Titan's core, passing through large black regions where her mapping was still incomplete. The fault twisted and turned, opening at times to a wide crevasse, then narrowing down until it was little more than a stress plane in the tortured rock.

She slowed down and pushed a button on the virtual display. Three-dimensional volume renderings of the stress field in the rock appeared all around her as glowing lines, fractal neon limbs cascading into smaller and smaller filamentary tangles. She filtered the display until all she saw were the glowing tangles against a field of deep, velvet blackness. The fault itself was a tortured sheet of cold fire.

She hovered there in the darkness, surrounded by light. *This* is what I know, she thought. *This* is familiar. She could as well have been in a geo-simulation of the Earth's crust. The equations of elasto-plastic deformation are invariant under acts of God and Man. Stochastic, fractal,

extraordinarily complex, the solutions could still be understood, predicted with some reliability, projected onto a lower-dimensional attractor for a smoother representation.

All well and good as science. As personal metaphor it had its drawbacks. Maddy knew people back home whose lives were distressingly simple—work, family, sheep-like pursuit of leisure all fixed, remorseless basins of attraction with no fractal boundaries. They eluded her, whatever drove them completely foreign. Her personal trajectory was constrained to a more chaotic topology.

With a corner of her awareness, she could feel her realtime body, helmeted, visored, ensconced in a padded chair in a darkened featureless room.

And in the lab, cocooned in biostasis, the embryo, a radiant point of light in her mind's eye. She could imagine the impossibly slow heartbeat, just enough to keep it suspended above the threshold of death. In quiet moments, she imagined that pulse to be her own, could feel her awareness contract to that tiny lump of blood and meat, miracle of coded proteins. One part Jax, one part Maddy. Something other than the sum of its constituents.

It was usually bearable, her awareness of it a dull, constant pressure in the back of her mind. But sometimes she felt an ache in the deepest part of her, as if it had been torn from her leaving a bleeding, septic cavity. How could it live apart from her? Or she from it? She would tell Jax soon.

III

He turned off the suit speaker. The sibilant whisper of his breath and the deep ocean surge of blood music in his ears rushed in to fill the silence. Titan's daylight sky arched over his head like a great inverted bowl, deep cyan overhead fading to a bruised purple around the horizon. The photochemical smog was thinned to a gauzy softness, a blurring of focus, and Sol hung overhead like a bright, fuzzy diamond. He could almost feel the weight of Saturn's presence suspended unseen in the sky, shielded by Titan's bulk.

He had walked about a klick along the shore. The station was no longer visible behind him and he felt exhilarated with the solitude. A herd of about twenty slugs had been pacing him as he walked, oozing along almost like a single organism. He hadn't been sure at first whether they started trailing him or he them, but he was certain they were aware of him now. When he stopped, they did. He walked another few steps along the rocky shore, and the herd moved along with him like an amoeba, extending a long, thin pseudopod which was then reabsorbed into the main body. This was the first time they had exhibited anything like a response to an external stimulus. Like *awareness*.

What *are* you? They stretched out before him, attenuating into a long, sinuously curving line, like an old river.

He closed his eyes and concentrated as hard as he could. *Tell me what you are.*

In his mind's eye he saw the pattern, a meandering line of bright sparks, ripple slightly. He opened his eyes.

Tell me.

Another rippling wave passed through the line.

He turned on his radio. "Maddy. Can you suit up and get out here. I want—"

"What the fuck have you been doing? I've been trying to reach you for the last hour." Her voice sounded tight and thin.

"I turned off the speaker. I—"

"Can you get in here?" Long pause. "Please?"

The holotank was on, but she was staring off into space. In the transparent, glass cube Jax could see ghostly, flickering images of fire and smoke.

"—retaliated with a 50-kiloton airburst over Manila. The latest estimates of the death toll—"

"What's going on?"

She looked up at him. Her eyes were puffy. "Paris."

He felt the word almost like a physical blow. "Shit. Where else?"

She shook her head. "It's all coming apart. Naft and Russia have managed to keep out of it so far, but it's just a matter of time."

"—emergency session, but no word yet from the CEO Council —"

"Anything from SunGroup?"

She shook her head again. She had the look of an accident victim—hollow eyes, slow, deliberate gestures.

"—ground forces overwhelmed Mitsubishi troops outside Sydney. Conventional theater weapons—"

Jax waved his hand sharply over a panel on the wall. The volume of the newsfeed decreased to a murmur. The holotank still flickered and glowed with the images of burning cities. He walked over to her and put his hand on her shoulder. She sat there stiffly, as if unaware of his presence; her shoulder felt as if it was made of wood. He put his other hand there and started to knead the tight muscles, but she shook him off.

He stood behind her for a long time, not knowing what to do. Every now and then, Maddy let out a long, shuddering sigh.

Finally she looked up. "What are we going to do?"

He shrugged. "What can we do? We can survive here indefinitely—the station ecology's intact and stable. We continue the research, wait for SunGroup to pull us out of here."

Even as he said it, though, Jax felt a rush of panic at the thought of leaving. He closed his eyes and a matrix of points, white on velvet black, pulsed and flowed. Concentric diamonds, slowly shearing. He opened his eyes and Maddy was staring at him.

"Continue the research? What for? We don't even know if there *is* a SunGroup anymore. We have to find out what's left back there, get back if we can. We can *help*."

Jax was silent for a long time. "What we need to do is survive, Maddy,"

he said slowly. "Keep the systems green, keep the research going. I'll try to raise Maurice, find out what their status is, but I don't know when they're going to be able to get to us. I think we're pretty much on our own."

"If they can spare a ship, I want to go home," Maddy said. "Luna, one of the O'Neills, I don't care. Our place right now is back there."

Jax forced himself to smile reassuringly. "All right, Maddy, we'll see what they can do. We'll have at least three hours until we can get a reply—"

"—a hundred-seventy-four minutes—"

"—providing we can get through at all. The Net is probably stone dead, all those e.m.p.'s." He gestured toward the holotank. "That stuff is probably coming in relayed from one of the O'Neills..."

"We can't really tell what's going on back there from the newsfeed— the information entropy is sky-high. We're not going to know until we ask someone who knows something. Let's just do it."

Together they walked down the corridor to the communications room. Jax logged on, set the protocol, and transmitted Maurice's address from memory.

He faced the blank screen. A section of it elasticized invisibly, ready to transform his voice into digitized bits and hurl them up to the relay satellite waiting at one of Titan's Trojan Points. There was no return visual, of course—dialogue was impossible.

Whenever Jax transmitted across the lightspeed gulf separating him from Earth, he had the sensation that his words were disappearing down a well. He could feel Maddy's presence behind him like a hovering cloud.

"Maurice. This is Jax and Maddy calling from Titan Station." Obviously. Where else would they be calling from? "Please advise us as to your status. We—"

"Pull us out of here, Moe," Maddy cut in. "Please. We want to come home."

Jax shot her an annoyed glance and turned back to the screen. "Please

advise," he repeated. "End."

Ignoring Maddy, he tried to log onto his WorldNet node, but couldn't get a stable carrier at the other end. Tried routing through Luna, through Olympus Mons, through the O'Neills.

"Nada," he said, shaking his head and looking up. Maddy was gone.

He looked in the lounge. Empty. In the holotank, a pair of translucent figures gestured in animated conversation, but Jax couldn't make out the words. Galley, labs, sleeproom, all empty. Finally, he walked down to the end of the corridor and pulled himself up into the pod. The fog nestled against the dome in thick, soft swirls. Maddy lay curled up on a foam pad, breathing deeply.

He walked past her to the edge of the dome and peered out through the fog. He could just see them, stretched out in a slowly undulating line next to the ammonia sea. The undulations grew until the line broke apart, the segments forming a series of rings. Slowly, one at a time, the rings merged and the pattern segued to a nest of concentric diamonds, slowly shearing. There was sense and meaning to it, he was sure, but comprehension hovered just out of reach. *What are you?*

The soft chime of the comm bell shook Jax out of his reverie. *Three hours? I've been standing here for three hours?* He looked around the dome, his eyes coming to rest on Maddy lying in a fetal curl, her shoulders slowly rising and falling. He stepped over her and lowered himself down the hatch.

There was no visual, but Jax recognized the flat inflections of Maurice's voice synthesizer.

"Sorry about the visual—we're under severe bandwidth restrictions. Power rationing, too, so I'll have to be quick. The fighting's almost over, except for a few hotspots. Earth is pretty much of a mess—Europe, Japan, Indonesia... latest estimates say a billion dead. Naft came through pretty well. Russia, too, but they're going to take a lot of fallout from PacRim. SunGroup is putting together a group at O'Neill Two, sort of a reconstruction team. We can use all the help here we can get, but we also need to keep the long range research efforts going. Your call, but frankly,

we could use you. We're sending a ship out to make a sweep of the research stations, anybody who wants to come back. Old ore freighter from the Belt, retrofitted with an ion drive. Best we can do right now. Let me know what you want to do. We don't want to burn up the delta vee to get out to you if we don't have to."

Jax listened to the spectral hiss of interplanetary white noise riding over the carrier hum. He played the message back again. The words began to merge together, their individual meaning softening like heated wax. He played the message back again.

IV

She hovered on the knife-edge between wakefulness and sleep. Images of smoke and flame, of exploding suns, chased each other across the surface of her consciousness. She was on a hover-barge on the Seine, sitting in the back at the controls. Sharp smell of moss and damp stone as she passed under a bridge. Her parents and sisters on the deck in front of her, sitting beneath a blue-and-white umbrella. Sipping drinks, laughing. Low grey clouds holding the threat of rain.

Suddenly, an impossibly bright light swelling from the east, a second sun breaking through the clouds. The umbrella bursting into flame, her family instantly transformed into stick figure torches. The Seine was *boiling*, bubbling up over the sides of the barge...

She opened her eyes. Jax's face hovered above her in the half dark. He put his hand on her arm.

"Dreams?"

She nodded, still gripped by the vision. "Yeah."

Jax stroked her arm. "I heard from Maurice," he said after a moment. "We're on our own, Maddy. He has no idea when they'll be able to get to us."

It was like a physical blow. Her tropism for home radiated up from the very center of her, from her First Chakra. Its denial sent a surge of panic

through her.

She closed her eyes. Breathe, breathe. In, I calm my body. Out, my breathing returns me to my true self. In, breathe calm, white sun swelling in the East. Out, listen, listen, Seine bubbling up over the sides of the barge. In, centuries old stone bridge sagging molten soft. Out, pillars of flame dancing on the deck of the barge snuffed by hammer wind.

"Maddy." Her eyes fluttered open again. "Are you all right?"

She looked closely at him. His long, thin face, so familiar, composed in a mask of concern.

Slowly, she shook her head. "No," she said. "Nothing's all right."

Maddy hadn't worn her environment suit in weeks and it chafed under her arms and between her legs. She looked back at the station, so out of place in the alien landscape, clinging in the tattered mist to the dark rock like a cluster of warts. The pod glittered in the dim light. She imagined Jax back there, his sleeping form sprawled naked across the foam pad.

She still ached slightly from their sex. He had been fast and rough, almost brutal. She didn't care, had lain there limply, receiving him. Her orgasm was joyless, passing through her like a wave, leaving no trace of itself.

When she got to the shore of the ammonia sea, she stopped. Small ripples lapped up against the rocky beach. She looked down at the canister she was carrying. Featureless, burnished metal, such an innocuous thing.

Without further thought, she pressed a recessed button on its side. A thin line appeared around the top rim and a puff of vapor escaped, freezing instantly into a cloud of scintillating crystals. She unscrewed the lid and shook its contents out into the sea. Shards of metglass webbing, spidery strands of plastic tubing, chunks of brittle, frozen foam. She couldn't even see the scrap of flesh they cradled. A few meters away, a small herd of slugs clustered near the shore in a senseless and inchoate sprawl. •