

Lighthouse by Michael Shara And Jack Mcdevitt

Some life changing events work on more than one level....

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Illustration by Broeck Steadman

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The applause after a dissertation defense is always polite, sometimes cool, but rarely sustained. Kristi Lang smiled and blushed as all fifty members of her department rose to their feet and cheered. Her fellow graduate students were the rowdiest of all, whistling and banging their coffee cups in unison on chairs and tabletops. Greg Cooper, the department head and her mentor, let it go on for a full minute.

"Ladies and gentlemen," he said finally, "thank you very much."

If anything, the noise intensified.

He needed a gavel.

Kristi stood, engulfed in the moment. She nodded, raised her hand, mouthed a *thank you*. A fresh round of applause, and finally it began to lessen.

She had discovered a new type of astronomical body. A special kind of brown dwarf. They were calling it a *chimera* now, but Greg had told her yesterday that they'd eventually be referred to as *Lang Objects*.

Greg was tall and thin, with an angular jaw, angular nose, dark hair, intense eyes. His students referred to him as Sherlock Holmes because of his world-class problem-solving skills and his intensely mediocre abilities with a violin. "All right," he said, signaling for quiet. "Let's pull ourselves together." That brought laughter. "I wouldn't want to cancel the wine and cheese."

The people around her were reaching for Kristi's hand, patting her on the back. Tim Rodgers, tanned and good-looking and brilliant, gave her an approving smile. He was impressed. Maybe even envious.

The time-honored Q and A had to be observed. Greg called for questions. Hands went up. He stepped aside and gave her the lectern.

Tim remained standing while the others took their seats. He was finishing his own thesis, and had been, until recently, at the top of everybody's list of People Who Would Go Somewhere. Now he was a distant second.

"Okay, Kristi," he said, "you've established the existence of a new class of object. How'd it happen?"

The explanation was simple enough. She'd been doing analytical studies of billions of brown dwarfs and had noticed a few anomalies. Way too much deuterium. But that wasn't the big news. She was holding that for later.

"We eventually found two thousand oddballs," she said. Brown dwarfs were failed stars. The chimeras, the Lang Objects, were anomalous. Odd. And not easy to account for with conventional physics.

"You briefly mentioned actinides," came another question. "But I don't see the connection. Please elaborate."

Kristi smiled and tried to look modest. "Think DNA," she said. "Common origin. Common purpose."

The comment puzzled everyone. Brows furrowed. They whispered to one another and waited for her to explain herself.

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In fact, her inspiration had come that past summer from a set of police blinkers mounted over a cabin on Kilimanjaro.

Hemingway's mountain. Now the site for the Yuri Artsutanov Space Elevator. Kristi had been on her way to the Clarke Research Station, poised overhead in geosynchronous orbit. She was hunting for the photons that she hoped would help explain the existence of the anomalous chimeras.

There were nearly two thousand of them, all young, concentrated in the spiral arms of the Milky Way, interlopers, deuterium-rich freaks that had no business existing. Clad in shorts and a Columbia University t-shirt, Kristi drove a Jeep across the savanna. The sky was heavy with clouds, and the smell of cool moisture hung in the late morning air. Storm coming, and she was already late. If she didn't hustle, she stood a good chance of missing her ride. The weather guy had said clear, bright and sunny, beautiful weather. She'd spent the last few months completely absorbed by her research, had analyzed a million images, looked for the needle in a billion haystacks, written a killer proposal that even Greg Cooper in his Holmes role couldn't fault. But here she was going to be left standing at the station. Scheduling rides on the Yuri was no easy proposition.

Not that it would matter in the end. Jeff would make the observations and deliver the petabytes to her account. They'd be perfectly de-biased and flat-fielded, even if she never floated through the observatory hatch. Still, the karma would be wrong. It was once in a lifetime, and she needed to be there when the evidence came in.

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The rim of Kibo, the summit crater, popped momentarily into view as she passed three thousand meters, and then promptly vanished into the gathering clouds. Raindrops began to spatter against the windshield. She started the wipers. The road was wide and designed to take heavy traffic, but it was still uphill all the way, sometimes at an almost impossible angle. The rain intensified, and pounded on the roof.

She slowed down as visibility dropped to about fifty meters. A truck passed going the other way. A burst of wind pounded the Jeep and water blasted across the windshield.

Her cell phone chimed. "*Kristi.*" It was Kwame Shola, the chief of operations at Yuri.

"How you doing, Kwame?"

"*Not so good. Where are you now?*"

"On the way."

"*Okay. But take it easy. We got snow like mad up here. Weathermen missed it completely.*"

Great. Just what she needed. "All right," she said.

"*No heroics, please. If you need it, we have a climber cabin at five thousand meters. Combo is 2718.*"

"Twenty-seven eighteen."

"*Remember e .*"

'e,' of course, lower case always, was the base of the natural logarithms, equaling 2.718281808 ... on into an infinity of digits. "Okay," she said. "I've got it."

Greg had been ambivalent about her working with the chimeras. Don't know where you're going to go with them, he said. You could wind up producing a lot of data and still have to throw up your hands and admit you don't have a clue about what they are or why they even exist. Put the idea on hold, he told her. Confine the research to more conservative areas, at least until you've wrapped up your doctorate and gotten an appointment somewhere. He was right, of course. The path of guaranteed success. But she was *fascinated* by the objects. Her father had always told her to follow her instincts. And her instincts took her right into the shadow of the deuterium dwarfs. They were so intriguing, so difficult to explain, that she simply could not resist.

She had never wanted to be anything but an astronomer. Her father, who'd been a high school science teacher, had brought home a pair of image-stabilized binoculars from the third Gulf War. When he gave them to the little redheaded six-year-old, she was transfixed. The Moon had craters and tall mountains. Jupiter was a tiny disk with moons of its own. And the Milky Way was a glittering pathway of stars. Distant suns, her father had explained. Countless millions of them. Some just like ours, some a lot smaller.

Why, Daddy, why are some of the stars different from the Sun?

He'd smiled and told her he didn't know, but that she could figure it out if she wanted when she grew up.

And one evening, in the Big Dipper, she'd discovered Mizar. Her father had been on the porch with her and she'd screeched at him, "Daddy, they're *touching!*" Twin stars. Over the next twenty years, her father could always get a laugh from her by repeating the phrase in a rising

falsetto. But in fact, as she learned later, there were five stars in the Mizar system. By her first year in graduate school she'd found a brown dwarf companion to the five. And used it as a clock to age-date the system. Her *Astrophysical Journal* letter hung framed in his den. But he got nervous whenever he knew she was going up to the Clarke Station.

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The rain turned to sleet and Kristi slowed the Jeep to a crawl. Her defroster was rapidly losing its battle with the Tanzanian snowstorm. She could no longer see the summit. A burst of wind shook the Jeep.

She tried to call Kwame for a weather update, but he wasn't answering. Something big with lights roared past her, going down the mountain. She jerked the wheel hard, hit the brakes, spun across the icy muck, and slid off onto the shoulder.

Maniac.

She sat listening to the sound of the retreating truck. Then she pulled carefully back onto the highway. It was getting dark.

She picked her way uphill, past boulders and patches of lichen. Occasionally the road emerged along the edge of a precipice and she could look out through a hole in the clouds across the savanna. Then the clear patch was gone and the road was winding up through the night while rain and sleet whipped across the windshield. She began to wonder whether she'd missed the 5000-meter signpost when her headlights swept over it. She didn't see a cabin anywhere, but it didn't matter because she had no interest in missing her ride. There was still a chance, if the weather broke, that she could make it.

The cell phone chimed. Kwame. "*How you doing, Kristi?*"

"I'm doing just dandy."

"*You find the cabin yet?*"

"Negative. Doesn't matter. I want to get up there before my ride leaves."

"*Kristi, they've canceled it. I told you that.*"

"No, you didn't."

"*Why did you think I wanted you to find the cabin? They're going to try again in the late morning.*"

"Okay."

"*Go to the cabin.*"

"I'm past it."

He sighed. "*Can you get back to it?*"

She looked behind her, down the road. It was dark and cold and she could barely see the edge of the highway. "I guess."

"Do that, then. Don't try to come up tonight. It's too icy. Already had one truck go off the road. Driver was damn near killed."

"Okay."

"You sure you can find the cabin?"

"Sure. Relax. Everything's fine, Kwame."

It was about a kilometer back, maybe two. She put the phone down on the seat and peered out onto the highway. Nothing coming in either direction.

She cut the wheel and started to turn. She couldn't judge how wide the road was, so she was careful not to go too far forward. She reversed and started back. Felt the rear wheels lose traction. Tried to go forward again. But the Jeep continued sliding back. And *down*.

My God, she was going into a ditch.

She fought the wheel, damning the Jeep and the highway and the storm. But it did no good and the vehicle slid sideways off the shoulder and crunched over a large rock into a snowbank. She shifted gears and gunned the engine. The wheels spun, the Jeep struggled forward a few centimeters, dug a deeper hole, and slid back in.

Damn.

She called Kwame.

"You want me to come get you?"

She looked down at the tee-shirt and shorts. The heater was on full blast. "No," she said. "Don't do that. I'll make for the cabin."

"Okay. Be careful."

"I will."

"Call me if you have a problem."

It was frigid out there. Better was to sit tight and wait for somebody to come along.

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There are twenty-one billion brown dwarfs in the Milky Way, give or take. Kristi had found and mapped almost every one of them. "The light output of brown dwarfs alternates wildly between adjacent wavelengths, Dad," she'd once explained to him. "My infrared survey filters are tuned to just the right wavelengths, so all other stars appear dimmer. The hard part is keeping track of them all, and repeating the survey a year later to measure their motions. Then

we have to sift out all the weird quasars that sneak through the filtering. That's why we have MEGASPEC. It catches them all."

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Brown dwarfs were not massive enough to ignite thermonuclear fires in their cores. They would always be failed stars, their dim glow generated by cooling and contracting. "Ninety-nine point six nines" was the delicious phrase she used in colloquia to describe her survey's thoroughness. No one had ever done that for brown dwarfs. Hell, nobody had ever done that for anything in astronomy. She had nailed the definitive sample for all time. Sure, there'd be a few hundred hiding behind luminous primaries, or lurking directly in front of distant quasars, but she'd gotten the rest. There was no arguing with twenty-one billion spectra and parallaxes and radial velocities and proper motions. She could tell you what the temperature of each one had been a million years ago. And where each one would be ten million years from now. Her census was the last word on how the Galaxy's failed stars had arranged themselves during the past thirteen billion years. She could chart the few ancient, metal-free brown dwarfs along their orbits looping far out into the Milky Way's halo. The larger population of metal-rich youngsters, the astronomical infants, clung to the plane of the Milky Way.

The chimeras (she settled for the term "anomalous objects" in her seminars) had been culled from her complete sample of twenty-one billion by statistical sifting and weighing. Every one of them had a spectrum that called attention to itself, that defied everything she thought she knew about this type of object. The surface abundance of deuterium was impossibly high. It was a heavy isotope of hydrogen, with one proton and one neutron, and the Big Bang had made only a pinch of it, before stingily shutting off production just three minutes after creation. There was no known way that any planet or star or galaxy or anything else was going to concentrate the primordial trace of deuterium to more than a pinch. The textbooks maintained that anything over 0.001% was impossible. Yet Kristi had found two thousand brown dwarfs whose composition was nearly fifty percent deuterium.

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It was frigid out there. The engine, which had been keeping her reasonably warm, coughed and died.

She tried to restart it.

Tried again.

When she opened the door, she smelled gasoline and stuck her head outside. There was a stain on the snow. She must have punctured the tank. Or the gas line.

The mountain highway remained silent.

Shut the door against the cold.

Okay. Crunch time. Can't stay here. The temperature in the Jeep was already dropping.

She checked to be sure she had her pen flashlight. Staple for astronomers. She turned it on and pointed it out the window, where the beam got lost in the snow. There was a travel bag in

back with light clothing, and she could try putting everything on, but she was still going to get pretty cold out there.

It was only a kilometer back, two at most. She could manage that. She pulled her bag from the back seat and began sifting through her clothes.

She put on two extra blouses. They weren't going to help very much, but she'd take what she could get. And there was a sweater. She pulled it around her shoulders. Felt like an idiot.

She thought about Tim. He was the romance that had never happened. Partly her own fault. Always too busy. And her father, safe and warm in their North Jersey home.

Love you, Daddy.

* * * *

The wind tried to take the door out of her hand. She hung on, dragged her bag out of the back seat, and chunked the door shut. The snow was driving at her, and it seemed to be coming from all directions.

The ditch was shallower than it had seemed, but the sides were ice, and she had to climb out on hands and knees. When she finally stood on the road, she fished out her penlight and turned it on. The world around her looked desolate.

The wind cut through her garments and chilled her to the bone. It literally took her breath away. She was wearing canvas shoes and her feet got cold before she'd gone a dozen steps.

The penlight beam outlined ditches and a snow cover fading into the night.

She pressed her arms against her chest and tried to push the cold out of her mind. Move out, Scout, she told herself. There's shelter back there somewhere.

Her toes went numb. A blast of wind knocked her down. When she got up, she no longer had the penlight. Didn't know where it had gone. She'd been carrying it in her right hand, but the hand had no feeling.

For the first time in her life, she felt real fear.

This was the darkest place she'd ever seen. There was no glimmer of light *anywhere*. The edge of the road was no longer visible. The world had vanished, had become a place utterly without borders, without any distinguishing features, other than the snowflakes that continued to rush at her.

She thought about calling Kwame. But she couldn't do that. What would he think? Poor woman can't get from the Jeep to the cabin without getting in trouble.

It was hard to breathe. Her lungs hurt, and tears froze on her cheeks.

She pushed her hands into her sweater pockets and started out again. Hell with it. Didn't need the light anyway.

Still no sign of anything. Not of a cabin. Not of the marker.

The terrifying truth was she could walk right past the marker and never see it.

She was counting her steps now. Roughly thirteen hundred to a kilometer. Right? She'd already come about five hundred. Or maybe one hundred. Somewhere, below her, she heard the sound of a plane.

She tried to pick up her pace. Keep moving. Keep watching. And think about something else. Think about Daddy's rising falsetto. If she was lucky the marker and the cabin would be right next to each other. *Why, Daddy, they'd be touching!*

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After a while, she became convinced she must have missed it. She debated starting back toward the Jeep, and looked helplessly in both directions. Couldn't have been this far. She'd only passed it about three minutes before she'd stopped and gone into the ditch. She'd been traveling about fifteen, twenty at most. How far was that?

She couldn't figure it out. She'd begun to feel as if she'd withdrawn into a cave, was looking out through her eyes from a safe place somewhere back of her nose.

That was funny, Lang. Laugh.

Ha.

Still trudging forward, she flipped open the cell phone. Time to confess. Tell Kwame she was in trouble.

Off to her left, a soft orange glow appeared in the blowing snow.

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Nothing about this class of brown dwarfs made sense. Their composition was just under fifty percent deuterium. Fifty thousand times what it should be. Crazy enough. The remaining half was mostly hydrogen, the ordinary one-nucleon variety. No problem with that, except that it left little room for helium, which, in most of the chimeras, totaled less than one percent. It was their larger than normal size that tightly constrained the helium abundance. Even Tim, the brightest young theorist she knew, had to concede the point. Every other cosmic object is born with the allotment imprinted by the Big Bang: a full twenty-seven percent. So where was the rest of the helium?

There was no way to hide helium in a still-warm brown dwarf, and all of the chimeras were warm Galactic infants. Kristi's deuterium reservoirs mocked her, because they simply could not exist.

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The orange glow hung momentarily in the darkness. Then it went off.

Somewhere, far away, she heard a snarl. Leopards don't climb this high, do they?

She started walking toward the spot where she'd seen the light. It came on again. And went off.

It had to be the cabin.

She moved closer. Saw the 5000-meter marker to her right. A metal sign, white with black numbers.

The light blinked on again. More distinct this time. It was a police car beacon. Set on a rooftop.

Thank God.

Wooden steps led up onto a porch. She saw three dark windows and a door. There were wicker chairs on the porch, and a table. She climbed the steps, felt the wind cut off as she came into the shelter of the cabin, and tried the doorknob.

It was locked.

A number pad was bolted to the frame. The combination. What was the combination?

Kwame had said, *Remember "e."* Twenty-seven eighteen.

The beacon kept flashing. Every few seconds. It reflected off the snow cover, giving her just enough light to work with.

She got it wrong the first time, and for a heart-stopping moment she feared the lock was frozen. Or she'd been mistaken. But the second try was golden and the door clicked. She pulled it open, kicked the snow out of the way, and half-fell through onto a stone floor.

The interior was frigid.

She shut the door and looked around. There were more wicker chairs and another table. A long row of solar batteries powered the beacon. A cot was set against one wall. And a pot-bellied stove stood in the middle of the room. She looked around for a thermostat. Saw nothing.

Someone had left a box of matches, and a yellowed copy of *USA Today*.

Kristi stared at the stove. My kingdom for a few logs. She could go outside and root through the storm. Maybe get lucky. But the furniture was more convenient. She picked up one of the chairs and brought it down hard against the floor.

It held together.

She tried again.

It was remarkably resilient. She stumbled around the cabin, looking for an axe, gave up, and went back to beating the chair. Desperation lent strength and, finally, it came apart. Enough, at least, that she could jam it into the stove.

Ten minutes later she sat in front of a fire that, if it was not quite blazing, nevertheless served to take the freeze off the room. She called Kwame. "I'm in."

"Good," he said. *"I was getting worried. Don't leave the cabin until the storm stops."*

"Have no fear. One problem--"

"Yes?"

"I left my transportation in a ditch."

"You were not hurt, I hope?"

"No, I'm fine."

"Okay. I'll send a truck down as soon as the road's clear."

"Kwame?"

"Yes?"

"Send sandwiches, too."

* * * *

Her toes began to recover some feeling. She found a blanket in a closet. It smelled of cigarettes, but she didn't care. She warmed it on the stove, wrapped herself in it, and closed her eyes.

She was wide awake. She'd have liked to read. But even if the light had been adequate, she'd left her briefcase in the car. In it were copies of *Physics Today* and *People*, which she'd brought for the skyride. And a marked-up version of her dissertation. Once at Clarke, there'd be no leisure. She expected to spend six days doing nothing but observing, reducing data, and sleeping.

The wind shook the cabin. And suddenly her eyes felt heavy. Her head drifted back, and the sounds of the fire, the sense of the storm outside, faded.

She woke a couple of times, and jammed more furniture into the stove. And once, toward the end, she saw gray light in the windows.

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The nuclei were piled high in her office. Thousands of deuterons. In the drawers. On the keyboard. Scattered across her desk. Each deuteron's green neutron and blue proton were

morphing back and forth, into each other, a colorful display of the strong nuclear force in action.

* * * *

Get the vacuum cleaner. Where was the vacuum cleaner?

She was still looking when a hand touched her shoulder. "Hey, Kristi. How you doing?"

Kwame.

The fire had gone out, but the stove still held some heat. "I'm okay," she said.

"Good. The road's clear. If you're ready, we can head out." Kwame was a middle-aged African, not quite as tall as she. His hair had gone white, and his features suggested he'd known some difficult times. He was wrapped in a heavy parka with the hood down. His dark eyes were shining, and he spoke with a British accent.

She pulled the blanket more tightly around her while she pushed her feet back into her shoes. "I'm ready," she said.

"You don't want to take a shower first?" He nodded toward the washroom, but kept a straight face.

A snowplow waited outside. The sun was behind some white clouds. It was relatively warm, and the cabin roof was lined with melting icicles.

She climbed into the passenger's seat and looked back at the police light. "If it hadn't been for the blinker," she said, "I'd never have found the place."

He nodded. "That's why it's there, Kristi."

She thought about suggesting he add an ax to the amenities. And maybe some canned goods. But, on second thought, maybe another time.

He passed her a jelly donut.

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Kristi had been to the summit of Kilimanjaro four times before, but the sight of the base towers and the nanowire ribbon stretching up to infinity was as exhilarating as ever. "It hasn't left yet?" she asked him.

"No. They've been waiting for you."

It wasn't critical that she be on site while her data were collected. But Greg had designed MEGASPEC and Kristi had written most of its software to confirm brown dwarf candidates, so a trip to recalibrate the million-object spectrograph was justified. And there would never be a time she'd pass on an opportunity to go up to the station, to see the home world from 36,000

kilometers. There was still a little kid in her somewhere. She'd commented along those lines once to Greg and he said it was true of everyone in the sciences who was worth a damn.

Kwame apologized that there was no time to shower and change. Have to do it in zero-gee.

"I'll try to keep away from the other passengers," she said.

"Ah. It is their loss."

They pulled up at the front door of the terminal, and she thanked him for maybe the fifth time. Then she was hurrying through the reception area and someone came alongside to help with her bag and briefcase. Moments later she cleared the entry ramp, and hatches shut.

There were roughly a dozen other passengers. About half of them were tourists, including two kids. They looked curiously at her as the carbon nanowires stiffened and the elevator lifted away from Kilimanjaro. Minutes later she caught sight of Lake Victoria. They rose through the clouds, and the Atlantic came into view. And eventually she was looking down at the entire continent, from the Cape of Good Hope to the Nile delta.

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Two hours out, at an altitude of 8000 kilometers, she got a sandwich and coffee from the convenience counter and settled down at one of the viewport tables to enjoy the ride. Closer to the chimeras, she thought. Well, not really, but the illusion was there as she soared ever higher.

She wished there were starships. She'd love to have an opportunity to go out and look at one of the things, close up. She knew how it would appear, of course. She had virtual brown dwarfs on call back home. They were Jupiter-sized spheres, red--brown, with mottled clouds floating in the atmosphere. The clouds were iron hydride, and of course the dwarf would be glowing, rather like a coal recently plucked from the fire.

She visualized it, and somehow she found herself thinking about Kwame's police lights.

Someone came over and asked if he could share the table. Of course. He was a young man, and she realized immediately he was on the make.

"...going to be pretty well tied up while I'm here," she was saying.

He was a technician of some sort. Dull-looking. Thought well of himself. "Of course," he said. "But all work..."

She heard him out, and smiled when appropriate. "They pay to send me up here," she said, as if she were making a major sacrifice. "...don't want me sitting around."

The police lights. She stared through the young man into the deep night of the 5000-meter elevation, saw the soft orange glow, blinking on and off.

And suddenly she understood.

* * * *

"I don't buy it, Kristi," Greg said. She had him on the vid relay, from his office. *"There's got to be a natural mechanism at work. Maybe high-pressure chemistry. Maybe magnetic fields. Maybe radiative levitation. Geochemical processes can concentrate minerals by orders of magnitude on Earth, so why not deuterium on the surfaces of brown dwarfs under far more exotic conditions?"* He sounded really concerned. It was why she liked him so much. He was worried about what would happen to her career if she tried to go public with her notion. She imagined it was hard for him not to say, *You're skating at the edge of academic disaster. Blow your reputation now and you'll always be at the fringe.*

"I admit," he said, *"that fifty percent deuterium is far out. But whatever did this could also bury the helium. We just don't know enough."*

"I think it's true," she said.

"It could be. Anything's possible, Kristi. But think about what the professional price will be if you go off half-cocked, and then someone finds the real explanation." Then, more gently: *"I'll go this far: Get two more pieces of independent evidence. If your idea stands up, Galileo will have to move over."*

* * * *

While the Earth dropped away, she worked on her computer. An hour later, still on the elevator, she raised a fist in triumph. The act drew the attention of several of her fellow passengers. She didn't care. She had a match. In fact, the chimeras, almost the entire sample of two thousand, except two, showed up at the same sites listed in the all-sky X-ray source catalogs as black holes. That gave her a stunning 99.9% correlation. How much proof do you want, Greg?

For the next five hours she looked fruitlessly for other patterns. She was still engrossed in her analysis, and trying hard to keep her sense of exhilaration under control, as the elevator began its approach to the station.

An attendant asked her to return to her seat and buckle in. She felt indestructible at the moment, but she happily complied. Galileo was a piker.

An orange light was blinking on the link-up collar. It reminded her of Kwame's beacon, and she smiled. A series of thuds reverberated through the hull as the elevator docked and the airlocks mated. Hatches opened and the passengers floated through into the connecting tube. The tourists would be headed for the hotel. The others scattered in different directions.

Jeff Fields, who ran the observatory programs, was waiting for her. "Jeff," she said, "I want you to do something for me."

"Okay," he said. "What do you need?"

"Tomorrow, before we make any observations, I need you to change to the highest resolution grating."

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Standing at the lectern before her mentors and her peers, Kristi had deftly fielded a dozen questions about her analyses and catalog. The privilege of asking the final question traditionally went to the senior graduate student. Tim. She'd seen him writing while she spoke, scratching out lines, making faces, writing again. When the moment came, he stood. "Sorry, Kristi," he began. "Nobody here is more anxious for you to be right. But I still don't get it." He glanced down at his notes, looked over at Greg, and plunged on. "Your high-res spectra and gravitational redshifts unquestionably prove that every one of your chimeras is eight Jupiter masses, and that each is orbiting something every year or so." He took a deep breath. "The X-ray source coincidences are a convincing argument that the somethings are black holes. But black holes can't concentrate deuterium or hide helium. Black holes were all once stars way too luminous to have formed with sub-brown dwarf companions in the first place. And, worst of all, your chimeras are too low in mass to ignite deuterium, yet they radiate like hot brown dwarfs."

The others around the table were looking anxiously from Tim to her. A few whispers began. "In theory," Tim continued, "your chimeras can't exist, right? But they do. So what's going on?"

You know, she thought, he really *is* good-looking. But not as quick on the draw as I'd thought.

He started to sit down, but got up again. "Kristi, you must have some idea how to explain these things?"

She looked over at Greg. He was gazing out the window at the beautiful autumn day. Then his eyes met hers. And he nodded. Do it.

Her paper had been accepted yesterday by *Nature*. Letting the cat out of the bag now wouldn't jeopardize anything. She'd kept everyone, other than Greg, in the dark. Even Tim.

"We classify anything less than thirteen Jupiter masses as a planet," she began, "because these objects never develop sufficient internal pressure to ignite their deuterium, let alone their hydrogen. Yet we now see objects eight times Jupiter's mass displaying surface abundances that can only come from deuterium burning. That's impossible with one thousandth of a percent deuterium. But deuterium ignition works just fine if these objects are born with eight Jupiter masses and fifty percent hydrogen and fifty percent deuterium, and they're somehow sparked." She smiled at Tim, who was sitting looking lost.

"By analogy," she continued, "a trace of air mixed with gasoline is stable, but a fifty-fifty mixture is highly combustible. A spark would set off a conflagration. Since nature can't make, or ignite, fifty-fifty deuterium--hydrogen objects, especially near the kind of massive stars that collapse into black holes..." she paused for effect, "...it's hard to see that the chimeras can be anything other than *artificial*."

The room went dead silent. A gust of wind struck the windows and she thought briefly of Kwame's cabin. At the doorway, a small group of professors had gathered. She wondered whether Greg had alerted his colleagues.

History being made today in the Bishop Library.

Tim looked stunned. "Kristi," he said, in a voice she did not recognize, "you're not making this claim seriously?"

"I am," she said. A wave of guilt passed through her. Maybe she should have taken him aside. Warned him what was coming. "They're artificial, as in *synthetic*. As in *not made by nature*. As in *manufactured by Little Green Guys*. I would argue they were deliberately placed in orbit around black holes that were born without companions. Some of each chimera's solar wind now falls toward its black hole. That superheats the wind so it radiates X--rays. Hence the chimeras coincide with catalogued X-ray sources. They used to be invisible. Now you can't miss them."

Guilt, hell. She was Hubble discovering that the universe extended far beyond the Milky Way, Rubin finding the dark matter that surrounds all galaxies. She was on top of the world. "At first I suspected they were an experiment, test objects of some kind. But that would be an experiment hugely wasteful of resources when you could get away with masses a million times smaller."

The professors at the door were crowding into the room.

"No, the chimeras' creators needed something self-luminous, something that would last a long time, but something that would cost as little as possible because they had to make two thousand copies. A fifty-fifty deuterium-hydrogen mixture is the nuclear fuel that can be ignited in the lowest possible host mass. It's the cheapest interstellar beacon you can make if you insist on a hundred-million year warranty. Nature can't make these objects. But somebody can." She took a sip of water as her words sank in.

"The helium makes sense, too," she continued. "It's the ash, the by-product of pure deuterium-hydrogen fusion, brought up by convection from the core. The helium content of the chimeras is limited to one percent or less because they're all younger than a million years. Each one will continue burning its core deuterium and will shine at its present luminosity for another hundred million years."

Tim was going to say something else, but Greg broke in. He was beaming. "Kristi, two of the chimeras are not associated with black holes. What can you tell us of them?"

"One of them," she said, "is moving at nearly three percent of the speed of light through Taurus. A second is in orbit around a G-dwarf in Scorpius. It's just under seven Jupiter masses, the lightweight of the entire sample, and the least luminous. I really don't know for certain, but I'd speculate that the first object is being towed or pushed toward a newborn black hole. And I wouldn't be surprised if the second one is on the assembly line."

The applause was tentative this time. Until the people at the doorway joined in.

* * * *

Greg had a final word: "My initial reaction, when Kristi ran all this by me, was the same as Tim's. But there's one more piece of evidence that convinced me. Kristi?"

She was at her charming best, at a moment she would always remember. "A thirty-meter telescope at geosync orbit," she said, "is an amazing instrument. But the chimeras are faint

and I couldn't find anything but deuterium, hydrogen, and helium in any of their spectra. When I realized that they had to be copies of each other, I removed the Doppler shift of each one and then co-added the two thousand spectra. The result is almost fifty times more sensitive to trace elements."

She touched the video controller and the summed spectrum appeared, undulating and smooth, with four sharp, narrow dips. "See those four absorption lines? Only one element makes those lines. Plutonium. The nastiest, most dangerous substance we know.

"Each chimera is seeded with pure Plutonium-244, which will last as long as the chimera itself. It's the closest thing to a universal skull and crossbones I can imagine.

"Ladies and gentlemen, the chimeras are beacons. Celestial lighthouses. Space-faring travelers are being warned away from the shoals. Away from the Milky Way's two thousand solo black holes, which are otherwise nearly undetectable."

"Magnificent," said one of the professors. "If true."

She smiled, as her audience collectively let out its breath. "The evidence is all there, Professor. And, if Greg doesn't mind, I could use a glass of Cabernet. If we could quit now?"