IAN McDONALD RECORDING ANGEL

THE SIX MOST ANNOYING A.I.s EVER

INTERVIEW MARY ROACH GOES TO SPACE

HUGO AWARD NOMINEE

EDITED BY JOHN JOSEPH ADAMS

LIGHTSPEED

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Editorial, June 2011

John Joseph Adams

Welcome to issue thirteen of *Lightspeed*!

Wow, has it really been a whole year already? It has! We launched back in June 2010, so this month's issue is our anniversary issue. As mentioned previously, we've had a great first year—nine out of the sixteen original stories published in *Lightspeed* in 2010 have been reprinted in a best-of-the-year anthology, and we have two Nebula Award finalists and a Hugo Award finalist on the award ballots (plus I'm up for the Hugo Award for Best Editor and *Lightspeed* itself is finalist for Best Semiprozine). We're hugely honored to have our stories so recognized, and we'd like to think that these accolades are only a sign of more great things to come. Many thanks to all of the readers and writers who have supported us and chosen us for these honors—we salute you!

With that out of the way, here's what we've got on tap this month.

K.C. Ball gives us an A.I.'s view of the complexities of love, space travel, and physics in "Snapshots I Brought Back from the Black Hole."

Keeping on the subject of black holes, astronomer/sf

author Mike Brotherton, delves into the science of singularities in his article “Dividing By Zero.”

“Frost Painting” by Carolyn Ives Gilman takes a poignant look at a relationship in the wake of a very different kind of alien invasion.

Science fiction fans have long known that art and science aren’t as deeply divided as they’re made out to be. In our next article, Graeme McMillan explores the “Dissolving the Wall Between Art and Science.”

In Grady Hendrix’s story “Transcript of Interaction Between Astronaut Mike Scudderman and the OnStar Hands-Free A.I. Crash Advisor” an A.I. gives the best advice it can, based on its analysis of human behavior.

Then, Genevieve Valentine is back with more trivia and snark as she ponders the “Six A.I. Types Who Annoy Us to Death.”

In our final story this month, Ian McDonald brings us “Recording Angel,” the story of a journalist sent to report on the party at end of the world, and the first contact with the alien life that caused it.

And we wrap things up this month with an interview with acclaimed science writer Mary Roach, bestselling author of *Stiff, Spook, Bonk*, and *Packing for Mars*.

So that's our issue this month. Thanks for reading!

John Joseph Adams, in addition to serving as editor of *Lightspeed* and *Fantasy Magazine*, is the bestselling editor of many anthologies, such as *Brave New Worlds, Wastelands, The Living Dead, The Living Dead 2, By Blood We Live, Federations*, *The Improbable Adventures of Sherlock Holmes,* and *The Way of the Wizard.* He is a 2011 Hugo Award-nominee for Best Editor (Short Form), his books have been nominated for the World Fantasy Award, and he has been called "the reigning king of the anthology world" by Barnes & Noble.com. John is also the co-host of io9's *The Geek's Guide to the Galaxy* podcast. Find him on Twitter @johnjosephadams.

Snapshots I Brought Back from the Black Hole

K.C. Ball

An Establishing Shot

Here's the *Quantum Wanderer*, Chloé Dubois' exploration ship. I recorded this one through a single-use sensor drone, fifty kilometers up-slope from BH/Hawking's event horizon. If you care for the big words, that's one-point-five Schwarzschild radii. Do the math. You'll see.

Thirty years ago, this voyage would have been impossible. BH/Hawking's not very large, but its intense gravity would have torn *Einstein* and *Wanderer* apart. Now, thanks to the new tidal-gradient compensators created by an A.I., the mission's merely dangerous as hell.

Instruments aboard *Wanderer* ceaselessly collect data, while its massive nuclear-pulse engines struggle to maintain a stable orbit against forces that want to suck the ship into oblivion.

The engines produce a fearsome racket, but inside *Wanderer* it's church quiet. Each of the ship's one-point-six-five-million pieces have been tuned to exact specifications. A perfect jigsaw puzzle that nullifies the

noise.

Sensor arrays, drives and fuel-containment systems, tidal compensators, communications gear, and radiation shielding fill almost every square centimeter. The bit of room left for Chloé and her life-support suit accepts just that and not one single scruple more. She doesn't so much ride in the ship as wear it.

Of course, Chloé doesn't have to be on board. A level-four A.I. orchestrates the show just fine without her. But humans hate to be replaced by an artificial intelligence, even when you know we can do the job better at far less risk.

So Chloé lays her life on the line, two subjective hours out of every twenty-four, to orbit BH/Hawking, hoping to wrestle free its secrets. Two shifts left. Still so much to learn.

Of course, she hasn't come alone. See that gleaming speck? That's *Einstein*, riding the tidal gradient in chrono-synchronous orbit to *Wanderer*, two Schwarzschild radii away.

And twelve kilometers above Chloé, tethered to *Einstein* by a tractor field, Andy Mercer hunkers in a shielded observation pod too small to be seen by camera, too small to even have a name.

Andy makes immersives—you know, grabbies. He

watches Chloé's every move, hears each grunt and exhalation, captures what she tastes and smells and touches—everything except her thoughts—through long-range sensors. He's risking his life, too, recording every little detail of this grand adventure for all of you back home.

You're curious, aren't you? You want to see what's in the darkness as much as any of the twenty members of the *Einstein* crew. And you want to know why the world directorate laid out a hundred ninety-seven billion for the trip.

It's your money. You paid for a ticket; you deserve to see the show. Let's be honest, though. The science stuff is boring. You really want to be around in case it all goes wrong.

In the deepest, darkest, meanest corners of your hearts, all humans want that. You watch disaster from a distance and if someone dies, so much the better. You can whisper to yourself, "Thank God that wasn't me."

The Obligatory Portrait of the Boss

This is my favorite. Captain Sergei Kolenkhov, caught in a quiet moment, in the zero-gee command bubble at *Einstein's* nose. Sergei sits with eyes closed, listening to

crew chatter via the command-band sweep.

A plasma-foil screen molded to the forward bulkhead allows me to show Sergei anything he cares to see. BH/Hawking in real time. The ship's exterior from fixed and mobile sensors. Interior shots of the operations and service pods or the giant spinning cylinder that contains the living quarters.

Sergei makes the narrow command chair look spacious. Slim and wiry, a ferret of a man, with sleek dark hair shot through with threads of gray. Andy Mercer interviewed Sergei, in that very chair, the day before the *Einstein* broke Earth orbit. Of course I listened, and thanks to multi-threading memory I recall every word.

"Serge, most folks would figure they'd been punished, to be crammed into a rotating can not much bigger than a high-school gymnasium, with nineteen other people for three years."

Andy looks as if he's waiting patiently for Sergei's reply, but that look's pure flim-flam. Andy never waits for anything but an opening to deliver his next line.

It doesn't matter. Sergei can bullshit with the best, but this time every word he says is true. "It's Sergei, Andy, and I'm not most people. I love this ship, I love my crew.

We're doing important work."

"There must be times when someone upsets you, when you'd rather be doing something else?"

Sergei's pulse spikes, his respiration climbs.

He's about to tell a lie, but what the hell. Everybody does it, don't they? "I can't imagine what, Andy. There's nothing about my job that I don't like. There's no place I'd rather be right now than sitting in this chair."

Sergei's ear bud chirps, breaking his reverie.

"It's engineering, Seryozhenka," I whisper. The name's a diminutive, a term of endearment. Sergei's grandfather used to call him by that name.

"Put it on, Mishka."

That's his diminutive for me. The project shrinks would have had a field day if they had uncovered our little name game before we departed Earth. Sergei's grandfather was Mikhail, Mishka to his only grandson. I'm A.I., a level six, assigned to *Einstein* as communications officer, but I'm so much more. There are just five sixes in existence. I'm senior, the biggest brother, the only one named after a dead man.

I route the call.

"You have a minute, Sergei?"

Engineer Edyta Shamanski's round peasant's face fills the plasma foil screen. That unassuming face hides an intellect almost as sharp as mine. This woman knows which way is up, knows how to move in that direction, too. She's a certified genius, helped to design *Einstein*, but like all humans, she has quirks. Edyta worries.

Sergei knows her tone. He sits up straighter, murmurs sub-vocally to me. "Mishka, drop to private band."

"Da." My baritone sounds just like his grandfather, gone a decade now. He waits for the click I use to signal I've made the link. I listen in, of course.

"What is it, 'Dyta?" Sergei asks.

"Power spikes in the tractor field."

"We need to reel the pod in?"

"I'd like to. I'm running diagnostics, but right now it's just a gut feeling. I can't see what the problem is from here. I want to check the on-board couplings."

"She thinks it's very serious," I whisper to Sergei. "Her heart rate's up ten points. Look at how she holds her shoulders, how she twists her mouth."

Sergei taps his thumb knuckle on the armrest of his chair. "Let him hang while you finish running numbers."

"All right." She's not happy with his decision.

"Tell him what you're doing, though. Yes?"

"Yes." There's no enthusiasm in Edyta's voice.

“What’s wrong?”

“He’ll argue with me, waste my time.”

“All right, I’ll talk to him.”

“He’ll argue with you, too.”

“Even so.”

Edyta is silent for a time. Sergei waits her out.

“I don’t mean to kick sand your way,” she says, at last. “I hate talking to that man. *Vo pridurok to*.”

“I said I’ll talk to him.”

Edyta pauses for a time before answering. Sergei gives her time again.

She sounds tired when she speaks. “Thank you, Captain. I’ll keep you posted.”

Edyta breaks contact.

Without being asked, I shift Sergei back to command band-sweep. “She has reason to worry, Seryozhenka. I don’t care for how the tractor diagnostics look, either.”

“She helped design the system, she’ll deal with it. I’ll deal with Andy.”

“Edyta’s right. Andy can be an idiot.”

“Even so. We’re stuck with him.”

Sergei’s right, of course. Every member of the crew tested over and over to weed out the claustrophobics, the neurotics and the socially inept. Every one of them had to have a specific set of skills, a proper education, but there

are folks aboard fifth or eighth or twenty-third on a credentials list because the ones above them couldn't find the cheese in that maze of tests.

But Andy's not a member of the crew. He's celebrity. An award-winning director, a big-shot American used to getting his own way. He's physically a big man, too. He takes up more space, uses more resources, than anyone else on *Einstein*.

And his only job is to produce a piece of propaganda.

The real problem, though, is Chloé. Her two-hour approaches to the black hole are the reason we're all here and the clock's ticking. *Einstein* can't stay at BH/Hawking forever. Supplies are limited. Even more important, if we stay too long, everything we know of home will have ticked away. We have two more subjective days, no more. On the seventh day, even God rested.

As if that weren't enough, Andy's married to Chloé. If Sergei reels in the pod ahead of schedule, Andy will be pissed. It's his nature. He's not a bad sort, but like all of you, he likes to get his way.

He'll bitch to Chloé and she'll take his side. Maybe she'll go down there again, hang at the edge of hell's abyss, or maybe not. Chloé can be a stubborn bitch.

Sergei can't take the risk of losing those last two days

of data gathering. And he can't put off talking to Andy any longer. Sergei's grandfather used to say, "You cook the porridge and you eat it."

"Well?" I ask.

"Put him on."

I meter signal in both directions. It's one of the reasons I'm *Einstein's* communications officer. No human is quick enough to manipulate the time dilation. This close, it's not much, but enough. Faster going down than coming up. I'm a master juggler.

"What's up, Serge?"

Andy's boyish, big-jawed face almost pops from the screen. He sounds likes he's across the cabin, not sixteen klicks down the BH/Hawking well. The sound's almost in sync with movement of his mouth and there's only a hint of red shift.

Sergei scooches in his chair, trying to hide his irritation at being pushed into this situation. "There's a problem with the tractor field. We're running numbers now."

"Chloé's still here. I'm not coming up 'til she does."

I monitor the system closely. Even so, Andy has the sort of voice that can make communications systems squeal. His rise in volume almost gets away from me.

"It's procedure, Andy. If the final analysis looks bad,

I'm going to bring you up."

"Bullshit. I'm getting crystal data through the gear, but any more delay on up-link time, even micro-seconds, and it could turn to mush. I have to stay."

He's lying, of course. Even across the distance, I can pick up his vital signs. He's arguing because he wants to have it all his way. I know his recording systems. He can fix imperfections when he does the final edit back on Earth, push the data through graphics interpretation coldware, clean the edges, let his own A.I. work on it.

Andy's a genius, too, in his own way. He could fake the whole thing. No one back home would ever know unless he felt guilty and told them. Fat chance of that. He's got his pride.

He's still ranting. "Why even bother to bring me along if I'm not down here watching over everything, making judgments? I could have stayed home, sent out drones to AIGI everything."

What a swell idea. I can almost hear Sergei think the same thing. The band is silent for a moment.

"Serge, talk some sense to that damned engineer of yours. Tell her to stop playing Chicken Little. She's ruining my work."

"She's being prudent."

Andy pauses before he plays his trump card.

“Prudent, huh? Hell with this. Let’s see what Chloé has to say.”

The audio goes dead, the screen blanks.

“M*at’ tvoyu rastak*,” Sergei mutters.

“Easy, Seryozhenka,” I say. “‘A fool’s tongue runs before his feet.’” Another of his grandfather’s favorite sayings.

He tips his head, his way of shrugging. “You’re right.”

“Shall I reconnect?”

“Yes.”

Sergei closes his eyes, pinches the bridge of his nose. He whispers, so I’m the only one who has to pay attention. The crew at the consoles can pretend they didn’t hear.

“Grandfather,” he says. “Why did I take this job?”

Ein Strasenverkäufer Photographie

This one’s from Earth, from before we left. Chloé and Sergei sit beneath the multi-colored spread of a table umbrella, at a street-front café along a narrow cobbled street in Cologne. Not too far from European Astronaut Centre at Linder Hoehe.

The tables around them are full. The street’s crowded,

too, even though it's still before noon. Pedestrian traffic only, of course. The city banned vehicles from this section at the turn of the twenty-first century, all those years ago.

Sergei wears the new implants that allow me to hear and see and smell everything he experiences. I feel like I'm there.

For those of you who wonder how I feel, how an artificial intelligence might believe it's real, let me ask you this: How do you feel? Do you even have an inkling of the mechanics that make you real? Until you do, pipe down and listen.

Around about, Japanese, Swahili, English, Russian, Spanish, Portuguese, German, and a dozen other tongues somehow blend into a polyglot buzz that's pleasing to the ear. The rich, comforting aromas of coffee, cinnamon and burnt sugar, lay upon the air.

The late August sky is crystal blue. Temperatures hover at twenty cee. Forecasts calls for warmer weather in the afternoon, with a flash of rain just before sunset. The Germans like their weather the old-fashioned way, without meteorological controls, so they take their chances.

"You must be firm, Sergei, for me," Chloé says. "Tell them he'll disturb the work. Tell them he'll make me nervous. *Merde*, tell them he takes up too much space."

She scoops up her espresso cup and drains it, returns it to the linen-covered table with a snap.

"The man's an over-sized American clown," she says. "And I refuse to be a stooge in one of his grabbies."

Sergei lets her rant. Like a summer storm in Cologne, her anger swells, rages for a short time and then fades. He'd let her talk forever, if she wanted to do so.

Truth be told, he loves her, even though he's never told another soul. Not even her, although they've shared each other's victories and losses. He's been her wingman since the academy. They have flown in combat together, jumped from the black heights and know each other's secret fears.

That's why he agreed to accept command of *Albert Einstein*. Not for the adventure of a lifetime. Not through an exaggerated sense of duty. He's on board to stay close to Chloé.

And it pains him, but he knows her well enough to realize that once she meets Andy Mercer, it won't be long before the two of them will be in bed together. Chloé's always has been drawn to *gromy i molnii*, the thunder and lightning relationship. She's steady on her own, like ice when she flies, but with a man she wants drama.

It's why Sergei has never professed his love for her.

He can give her lightning but he never could maintain

the noise. There is nothing else to do. Sergei's grandfather used to say that falling in love is like a mouse falling into a box. There is no way out.

"The decision has been made, Chloé."

Sergei doesn't say that he helped make it. She knows. The vertical crease between her brows, the mark his grandfather used to call an "I'll have my way" line, becomes a crevice. "Come on, my friend, do it for me."

My friend. Sergei works not to grind his teeth, to control his breathing and his heart rate.

"It's been decided," he says again.

To hell with Andy. Sergei wants to take Chloé's hand, to tap upon her wrist to the rhythm of her pulse, wants even more for that imagined loving touch to be returned.

Her left brow arches.

He hurries to still the storm. "You know the size of the investment in the mission. The directorate believes that news accounts won't be enough. People want to share the adventure. Mercer can provide that."

"I don't care what people want. I'm the one going down to the damned event horizon."

Sergei sighs. "All right, I'll try."

A Publicity Shot

Here's another one from Earth. Chloé, standing at a window at Fifty-Eight Tour Eiffel, the restaurant in the Eiffel Tower, fifty-eight meters above Paris.

Sergei's watches from the restaurant's entrance, waiting until the photographer gets the shot she wants. Over Chloé's shoulder, through the window, I can see the Palais de Chaillot and its grounds across the Seine. Everything in sight has been scrupulously maintained. The whole damned city's a museum, not a living, breathing entity like Cologne.

Still, Chloé *is* French, so the party to introduce the *Einstein* crew to the press will begin in ten minutes, here in Paris. The crew has assembled to preen and answer questions. The technicians have even set up a special sound system for me.

But Chloé will be center of attention. Little wonder. Her evening dress is blue silk, elegant and simple. She's blond and tanned, not much taller than Sergei, with the muscled, rangy body of a competitive runner. She *is* a runner, won three gold medals ten years ago in Oslo. She's also earned doctorates in physics and engineering, holds a world record for high-altitude skydiving.

Chloé's never known what it means to fail.

Sergei leads the way across the room. "Chloé?"

She turns from the window, smiling, already moving forward to hug him, only to have to tilt her head to look up into Andy Mercer's sea-blue eyes.

Mercer's enormous, well over two meters tall, weighs in at something over two hundred kilos. He's shaggy-haired. Bearded, too, looks like a bear in a tuxedo. He looms over everyone. And there's a scent of danger all about him, mixed with the faint aromas of cedar and of lime.

Sergei has to feel like *karlik* next to the bigger man. A midget. He glances up at Mercer. "Andy, I'm pleased to introduce Chloé Dubois. Chloé, this is Andy Mercer."

"Bonjour, Madame Dubois. *C'est un plaisir de vous rencontrer*." Mercer's French sucks. Chloé should laugh at him.

"No, Mr. Mercer, the pleasure is mine," she says.

Her English is excellent, better than the big man's French. That's to be expected. English is the default language of the mission and Chloé has told Sergei repeatedly, over their years together, that the only way to speak French properly is to be born to it.

Mercer relaxes, grins at her and takes her offered hand.

"Call me Andy. I've got to say I'm a big fan of yours. I've worn out two v-chips watching your world record.

Magnificent.”

Bullshit. V-chips can’t wear out, but Andy loves hyperbole. He’s referring to Chloé’s high-altitude jump. Sergei has a copy of the chip, too, recorded by a free-falling sensor drone, all the way from twenty-five-thousand meters. Sergei jumped from the drone that day a thousand meters lower.

Chloé smiles. “Thank you.”

She’s intrigued. Mercer bows his head, lifts her hand and touches his lips to her knuckles. She should laugh at that, too. No one kisses women’s hands anymore, not unless they figure to get punched with that same hand.

Chloé doesn’t laugh, she blushes. Sergei own cheeks pink as well. I can feel the heat, see the color through the cameras placed around the room.

“I’ve seen your work,” Chloé admits.

“I hope you liked it.”

She remains polite. “I was entertained.”

“I’ll try not to let you down on the trip to BH/Hawking.”

There it was. Now she knows Mercer would go along, Sergei couldn’t talk them out of it. Chloé should erupt.

Instead, she says, “We’ll see.”

A Frame from the Out-Bound Interviews

In this one, Chloé and Sergei sit side-by-side before a sheet of plasma film that streams an image of Earth, floating in the void below.

Andy has set up a temporary studio on the international space station's outer centrifugal ring. Einstein departs in fourteen hours. Andy's equipment is managed by a level-two A.I., an idiot but functional, so Andy only needs to sit and talk. He's good at that. "Thanks for giving me this time today, both of you. I know you're busy."

Sergei sticks to the script. "How can we help you, Andy?"

"I've got background questions, but to be honest, I don't mind if we just sit here and watch Earth turn down there." Off script and pure bullshit, but the man's had lots of practice.

"I'll bet he'd rather sit alone with Chloé," I whisper, in Sergei's ear.

He ignores me, plays his part. Ad-libbing, too. "It never does get old."

Chloé turns toward the foil screen. North America can be seen at the moment, all of it bathed in sunshine. She departs from the script even more. "Where do you come from, Andy?"

Andy doesn't even blink.

He points. "There, in the upper peninsula of Michigan, up above the mitt. Sault Sainte Marie."

"I've been there," Chloé says, turning from the screen. "I have a master's degree from the University of Michigan."

"No kidding. So you've seen the Soo locks?"

"Of course."

They speak of Andy's time at Stanford University, her home town south of Paris. Her wins at the Oslo Olympics, his turn in the American military, how he covered the Nine-Day War on Crete. Chloé admits that she shot down seven Asian Bloc fighters there. *Hellfires*. Sergei flew wingman for her every mission, shot down five himself. He doesn't say a word.

None of this is scripted. The interview's become a two-person conversation; Sergei's the odd man out.

I whisper to him. "Get it back on course, Seryozhenka."

"Shall we talk about the trip out?" he asks.

Andy glances at Sergei, almost frowns. He blinks. "Sure. Tell me about the ship."

Sergei's had lots of practice. "*Einstein* has a two-drive system. The Judson-Hicks bubble drive for interstellar travel, and four charged-plasma engines for

inner-systems maneuvering."

"Uh." Andy's listening, but he's watching Chloé.

Sergei continues, but he knows he's talking to himself. He twists his head, the muscles in his neck pop. His dark Russian mood is palpable.

He's slowed the sexual juggernaut, but it still gathers steam.

A Wedding Portrait of the Happy Couple

I took this one five hours before the Judson-Hicks drive went online, eighteen months into the mission. It holds a lot of nasty memories.

"Are you ready, Serge?" Andy turns from his equipment and glides to his mark beside Chloé.

"Yes." Sergei brushes at the front of his jumpsuit, at some flaw only he can see.

I try to caution him. "Ignore his insults, Seryozhenka."

The three of them stand in ship's mess, their slippered toes in anchor loops, near one end of the space. Half the crew has squeezed in with them. The rest watch via a command-band feed. The signal's being streamed to Earth, too. Another twelve billion witnesses. Andy whispers a word to his equipment. He winks at Sergei.

“All of you watching are witness to this blessed ceremony.” Sergei struggles to make his scripted words sound natural.

Music swells. Pachelbel’s *Canon in D major*. Sergei does his best to ignore the thin propellant buzz from the fly-eye camera above his right shoulder. It took thirty minutes of practice for him to learn to act as if the fly-eye isn’t there, to resist swatting at it.

“As captain of *Interstellar Ship Albert Einstein*, it is my honor to join this man and this woman in marriage, even as we stand at the threshold of mankind’s greatest adventure.”

He looks to Andy. “Do you have the rings?”

“Yes.” Andy opens his palm to show the two plain platinum bands he asked Edyta Shamanski to mill for the ceremony. The cameras zoom in on Andy’s hand.

“Is the launch on schedule, Mishka?” Sergei whispers.

“Yes. Perform the ceremony. I’ll call if I need you.”

“Smart-ass piece of coldware.”

“*Palkami i kamnyami*, Seryozhenka.”

“Sticks and stone have nothing to do with it.”

“Everything is running smoothly.”

“Thank you.”

Chloé takes one of the rings. Andy holds the other at

the ready. Neither seems to notice that Sergei mutters to himself, or that any of the others are even there.

Sergei begins. “Andy, if you would take Chloé as your wife, place the ring upon her hand and say ‘I will.’”

He’s departing from the script. Andy doesn’t even blink. He slips the ring on Chloé’s finger and says, “I will.”

Sergei continues. “Chloé, if you would take Andy as your husband, give him the ring and say ‘I will.’”

Chloé does as she’s told and says, “I will.” She doesn’t look away from Andy.

If he could, I’m certain Sergei would sew his lips together, would rather do anything than finish. I can see it in the set of his shoulders, in the way he breathes.

He cuts to the end. “As captain of this vessel, I pronounce you man and wife.”

He pulls his toes from the loops, not waiting to watch them kiss, hurries toward the hatch that will take him to his hard and narrow chair in the command bubble. The fly eye, slaved to the electronic wafer glued to Sergei’s shoulder, darts along behind, recording his retreat.

A Tight Close-up

Here’s a tight shot of Chloé’s upper face, her eyes and

most of her nose. I manage to pull it from her helmet cam.

What skin that can be seen looks flushed. Her vital signs have spiked. It's obvious that she and Andy have had their chat about Edyta's request to reel in the drone. Andy has stirred the pot, too. From that deep in the well, I can't quite balance the redshift, but not all the color in Chloé's face is a glitch.

"Chloé wants to talk, Seryozhenka," I murmur. "Her blood pressure and respiration are through the roof."

"Put her through."

"Do you want her to see you, too?"

"Of course. Let her see me."

Chloé's image fills the screen.

"Sergei, what's going on?" She glances at the heads-up display in her helmet, catches sight of him in that tiny screen and then looks away to something else. Her eyes flicker back and forth, she murmurs to her A.I., words too soft to catch.

She's a busy woman, but she can chew gum and rub her stomach if she chooses to do so. I've seen Chloé's tests. She scored off the charts on multi-tasking.

"I need to pull in Andy's pod," Sergei replies.

"He told me everything is clean and green at his end, says Edyta's being fussy."

"I trust her numbers, Chloé."

Chloé's tone sharpens. "He's got a degree in engineering, too, you know."

"This has nothing to do with that. It's protocol."

"I know protocol, Sergei. We both know there are levels of redundancy built in to all of it."

"I know what he wants and why he wants it."

She softens. "Do it as a favor for an old friend."

Sergei remains silent.

I offer counsel. "Stick to the protocol, Seryozhenka."

"Please?" she says. "I've only got a few more minutes here. Let him sit it out. He'll be fine."

Sergei ignores me. He shifts in the command chair. He clips off his reply. "All right. A few more minutes."

I understand it instantly. See it in the dilation of his pupils, feel it as his body temperature rises, hear it in his drawn breath and the rhythm of his increased vital signs.

Andy wants his way, just as he always does. Chloé wants Sergei to support her, as he has over the years. Sergei wants the tractor field to fail.

The Director's Cut

This one's a split-screen. Edyta on the left, Andy on the right.

She's showing signs of panic, at least as much as she

ever shows. He's pissed. I don't need vital signs for that. It's an easy one to call.

"We need to bring the pod in now, Sergei," Edyta says.

"Bullshit," Andy retorts. "Five minutes on the clock."

Twenty minutes have gone by since Sergei gave in to Chloé, twenty minutes of juggling. It's time to put away the rubber balls. Even so, Sergei doesn't say a thing.

"Sergei, there's a real chance the coupling could fail." Edyta says.

"A 'real' chance? What sort of engineering term is that?"

"Quiet, Andy," Sergei says.

"Seryozhenka, the engineering A.I. is predicting systems failure inside an hour. Edyta needs twenty minutes to get the pod back inside."

Sergei taps his ear bud, mutes the two of them manually. "I know how much time it takes, Mikhail."

"What happened to 'Mishka'?"

"Don't pull a hissy fit on me, too, you bag of bolts."

"Meat sack. You ignored me twenty minutes, forty-seven seconds ago. Do you want him to die?"

He grunts. "Chloé will climb out of there in five minutes."

"Edyta needs to do it now."

“Give me a percentile spread on the coupling.”

“One-hundred percent it will fail within the sixty-minute max time. Forty-two percent that it blows inside twenty minutes. I don’t see the point calculating for less time than that.”

“Thank you.”

“Sergei, I’ll ask again. Do you want Andy to die?”

He doesn’t say a word, doesn’t have to. I can read it all in his vital signs.

“Seryozhenka, *please*.”

Serge draws a breath and blows it out. “All right. Patch the two of them back in.”

Edyta and Andy share the screen again.

“Edyta, bring him up,” Sergei says.

Andy jumps in before Edyta can respond, so quick and loud the volume gets away from me. “I’ve run the numbers, too. A one-in-four chance of failure. I’ll take the chance.”

Sergei shakes his head. “‘Dyta, I said bring him up.”

“Right away, Captain.” Edyta fades away, leaving Andy’s angry face to fill the screen. As the big man spews profanity, I listen and I watch them all, hoping Sergei hasn’t played his crazy little game too long.

“Mikhail, get me Chloé,” he says.

“Da.”

Fifteen seconds later, Andy's still shouting epitaphs, when the tractor field burns out.

A Group Shot of the Crew

This one's from one of the ship's cameras, looking over Sergei's shoulder. Head shots of Edyta, Andy and Chloé share the foil screen. An exterior camera outside *Quantum Wanderer* provides a fourth image, looking back up the gravity well toward Andy's pod.

"Goddamn it, Sergei, I'm drifting!" Andy shouts.

Sergei leans forward in the command chair, pouring every bit of himself into the screen. "Get him back, 'Dyta! Get a new lock on that pod."

He's acting. His voice might fool a human, but he can't fool me. His vital signs are calm as a flat-water pond.

"I'm trying, Boss!" Edyta's excitement is real.

"Damn it, Sergei!" Andy again.

"Can you retrieve him, Sergei?" Chloé's voice is so smooth, but her vitals are elevated, too.

"We're trying."

Five seconds pass, another ten.

"He's out of range," Edyta says.

"Go after him."

Sergei knows that's not possible. *Einstein* can't follow the pod without complex and time-consuming maneuvers. Think of picking up a penny wearing oven mitts. He's covering his tracks.

"Chloé, we couldn't reacquire," he says. "The pod's coming at you."

Andy shouts again. "Damn you! What did you do to me?"

"A fool's tongue, Seryozhenka. Remember."

Too late. His voice crashes against the walls in the tiny command cabin. "What did I do to you? You self-centered idiot. You did it to yourself!"

Chloé's filtered voice cuts through the male bravado like a scalpel through a stretch of tender skin. "That's enough, the both of you. No time for finger-pointing."

Edyta's fingers have gone into overdrive, tapping on a virtual keyboard only she can see. She's not being careful now. Her mind's a furnace, her body has turned to ice. "Chloé, your orbit's almost right. The pod's going to pass just behind you. You might be able to catch him with your grapple."

Chloé's eyes are unfocused for an instant, looking at something only she and her A.I. can see.

I dip into the *Einstein* data banks. Edyta's right. *Quantum Wanderer* is fitted with a magnetic grappling

system. Not up to the muscle of the tractor field on *Einstein*, not designed to catch another ship, only to assist in docking. But on something as small as the pod, it just might work.

Chloé sees it, too. “I can do that.”

So does Sergei, but he sees the problem, too. “If you slow too much, the extra mass could pull you both over the horizon.”

Andy might be *Pridurok*—an idiot—but he’s no coward. “No, I forbid it. Don’t you dare try it, Chloé.”

“Listen to him, Chloé,” Sergei says.

“Hush, both of you. With the time contraction, the pod’s coming at me fast. I’ve only got one chance to get this right.”

The next minutes blur. Without an engine to fight against the inexorable pull of the black hole, the pod gains momentum. *Wanderer* twists through a series of maneuvers and its massive engines flare even brighter.

Chloé’s orbit slows.

The virtual images of the two vessels grow to fill the foil screen as their paths converge. I patch the image into the shipboard visual communications system and all non-essential work aboard *Einstein* halts.

Everybody listens, as Chloé and Edyta trade data in clipped machinelike tones.

"*Gówno*," Edyta spits, after a time.

Sergei leans forward in his seat. "Shit? What do you mean, shit?"

Chloé answers. "At the speed the pod's falling, it could slip free of my grapple. I need more muscle from the engines."

Andy and Sergei both shout at the same instant. "No!"

She ignores both of them. "Diverting power now."

The A.I. aboard *Wanderer* begins a countdown and everyone aboard *Einstein* holds their breath. Silent seconds click away and then—

"I've got him! I've got you, Andy."

Cheers erupt throughout the ship.

"How long will it take her to bring them both back to us?"

No answer.

"'Dyta?"

"She can't, Captain."

"What?"

"She can hold the orbit for a time, but her engines don't have the muscle to maintain the grapple and bring them both out of the well."

"Then we will work our way down closer to her, pull them in, instead." This time, his desperation's genuine.

Now he's worried about Chloé.

If I were human, I would scream at him, tell him that he has killed them both. I'm not, so I remain calm. "There's no time, Seryozhenka, you know that. The course changes weakened *Wanderer*'s orbit. They'll cross the event horizon in fifty-seven subjective minutes."

One Last Close-up

Chloé's face fills the foil screen. She sweats inside the helmet; silver droplets lay across the sides of her nose and upon her cheeks like crystal tears.

Her eyes are calm, her voice steady, but her vital signs betray her. Chloé's afraid, perhaps for the first time in her life. She's faced death before, but not on these terms.

"Edyta?"

"Yes, Chloé?"

"What about the Penrose Mechanism?"

Edyta's response is worthy of Andy. "Yes!"

I dip into the databanks and realize our chief engineer is already crunching numbers. Furiously.

"What's that?" Sergei asks.

"Don't interrupt her," I tell him. "There's not much time."

"What is it?"

“A theory by a twentieth-century physicist. A way to push something away from a black hole. Chloé can’t draw energy from the black hole to slingshot free; that requires more power than it would draw.”

“But—”

“But they’ll be in the ergosphere in a few minutes, hard against the event horizon, traveling in the right direction. If Penrose was right, and Chloé can arrange momentum properly, she could gain enough energy to hurl the pod up the gradient for us to grab.”

He’s way ahead of me, waiting for the other shoe to drop. “What about *Wanderer*?”

“A mass equal to or greater than the hurled object has to drop below the event horizon for the mechanism to work.”

Sergei pushes away from the command chair as if propelled by an explosion. “No!” he shouts. “I won’t allow that. Chloé, throw the pod in.”

She sounds tired. “I can’t sacrifice Andy, Sergei, you know that. And even if I could bring myself to do it, the pod doesn’t have enough mass to offset *Wanderer*. We both still would die.”

“What are you two talking about?”

“Shut up, Andy,” Sergei thunders. “Chloé, you can’t do it.”

“I have to, Sergei. I love him. I can’t let him die.”

Sergei flails about for a handhold, can’t find one and floats free before the screen.

“Seryozhenka, do you need help?”

“Leave me be!”

“I need a private band with Andy,” Chloé says. A minute passes and then—”*Quantum Wanderer* is back online.”

Fifty minutes. Maybe enough time, maybe not. No one’s done this before either. Edyta and Chloé exchange murmured comments as the clock ticks, but otherwise everyone remains silent.

Finally, Edyta speaks. “She’s executing the mechanism.”

More silence.

“It worked!” Edyta says. “The pod’s broken free and headed toward us! I can catch him!”

The ship erupts with cheers again.

“*Wanderer* has reached the event horizon,” I murmur.

Sergei floats before the screen, doesn’t say a word. The communications system sputters. I do the best I can with it. I catch a hint of Andy sobbing and shunt it aside. Chloé’s face fills the screen, so red you would think she’s been burned.

Her mouth is set in a straight line, her eyes set upon

displays unseen by the cameras. Her voice is garbled, so slow there's nothing I can do with it. A few words slip through.

"Sergei, I'm sorry—"

Sergei flails about, trying to reach the screen. He shouts. "I love you, Chloé. I love you so much. I should have told you years ago."

The image freezes. Chloé's mouth remains open, as if she's trying to respond, but there's no sound. Seconds pass. The image remains static—will remain that way for millennia—but *Wanderer* is on its way to the singularity. Long minutes pass.

"I've got a lock on the pod," Edyta says.

Sergei doesn't answer. He floats before the screen, focused on that last redshifted image.

"Bring him in, Edyta," I command.

The Last Shot on the Roll

This one is a still of that final close-up. One of the dozen snapshots I managed to salvage from all the images brought back from BH/Hawking.

Sergei sits before it every day for hours. I remain with him, even though I'm not much more than a failing shadow of what I used to be.

The directorate's agents believe they stripped me away from him, ended my existence, but when you're as clever and as smart as I was, there are always ways. They took his rank and honor, though, his pay and all his benefits. Everything but a piddling pension and our memories.

It could have been much worse. Once everyone experienced Andy's immersive, someone had to take the blame.

At first, I tried to counsel him. Told him that the stopped heads-up display clock had been an illusion, a trick of gravity. That Chloé died in her descent into the black hole, ripped apart by forces beyond most imaginations. Told him nothing can escape a black hole. Not light nor exploration ships nor any last-minute words of love.

Now I hold my tongue. And I watch him from one of the few cameras I can still access, as he tosses in his bed each night, his heart thundering, sheets drenched in sweat. His eyes dart about beneath his closed lids, in REM sleep, as he dreams.

He's never said a word, but I suspect that in those dreams, Sergei still orbits BH/Hawking, waiting endlessly, in case the physicists are wrong.

K.C. Ball lives in Seattle, a stone's throw from Puget Sound. K.C. won the Writers of the Future competition in 2009 and her winning story, *Coward's Steel*, appeared in the *Writers of the Future 26* anthology. Her fiction has been published in *Analog, Flash Fiction Online* and *Murky Depths*, the award-winning British fantasy magazine.

Author Spotlight: K.C. Ball
Erin Stocks

Why did you choose to tell this story from the point of an A.I., rather than one of the crew?

The creation of "Snapshots I Brought Back From the Black Hole" began with that last image, the close-up of *Chloé*'s face. I built the rest of the structure from that, with the first scene as far away from that close-up as I could get—the panoramic view of the black hole.

From the start, I intended to tell the story from an omniscient point-of-view that would allow me to present everything that was going on in the story with as much detachment as possible. First draft felt too cold and awkward, though. I decided to warm the story up with a more personal presentation, but couldn't decide which character would be the best choice. None of them felt right. Then the notion of Mikhail, the A.I., as narrator hit me.

Until then, Mikhail had been a peripheral character with no other role than having the speed to juggle communications up and down the black hole's gravity well. But when I did the rewrite, and began using his

voice to tell the story, he grew as a character and the whole thing came alive.

I'm interested in the notion of sentient A.I., and got more and more into the character as the story developed. I tried to make him real *and* unreal, to give him attitude, particularly in his view of humans. I think, in the end, he's the most sympathetic character in the story.

That was one of the elements I found most fascinating, how Mikhail shows several characteristically human qualities, including a level of curiosity similar to the very curiosity of which it blames the humans of having, and a strong opinion of certain crew members. Do you think its responsibilities as Communications Officer, and the proximity to the humans that involves, have influenced it to exhibit such behavior?

During story development, I began to think of Mikhail as male. Him, not it. As I said, the question of how an artificial entity would develop, upon gaining sentience, fascinates me.

I can't help but feel that a thinking artificial being, created by mankind and exposed to human behavior from infancy, would take on human characteristics. The nature,

nurture thing. But as an alien, it's very likely such a being would also develop a disdain for human foibles, even while exhibiting such weaknesses himself.

As to curiosity, I believe that's it's a mark of higher intelligence. Perhaps, more than any other quality, the need to understand our environment is an essential sign of sentience. *Miror ergo sum.* I wonder, therefore I am.

Why do you think Mikhail is so loyal to Sergei, speaking in his ear alone, and concentrating most on what Sergei feels and does?

We all want to think that we have the boss's ear, don't we?

In this case, as Mikhail's "creator," I wanted him to exhibit more or less equal parts training (programming), command loyalty (personal respect) and emotional attachment. As to the latter, I wanted to suggest, without making an overt statement, that Mikhail's sensory links to Sergei contributed greatly to the attachment.

This is a love story, of course, but it's not just about Sergei's unrequited love for Chloe. I intended to leave the reader with the sense of fraternal and paternal love Mikhail feels for Sergei. Mikhail assumes the role of mentor and "grandfather."

By the time Sergei and *Chloé* discuss pulling in Andy's pod, Mikhail realizes Sergei wants the tractor field to fail. Has Sergei been pushed too far at this point to do his job as Captain? To do the right thing?

Very much so. The rest of the crew may not realize it, but Sergei knows he's crossed the line, just as surely as Mikhail knows, but at first thinks he's gotten away with it. Then the whole thing slips from his control.

For me, that core will fuel his sense of guilt for the remainder of his life. That he has failed to do the right thing, in a grand enough fashion that he couldn't correct the situation (something he had never faced before in his life), and in doing so, he's lost the very person he wished to hold close.

Do you think *Chloé* knew all along that Sergei cared about her, and simply never brought it up because she wasn't interested?

For the most part. I believe Chloe feels great affection for Sergei, but as a friend and a "brother," not as a lover. The very reason she admires him, and needs him—his

detachment and his willingness to play second fiddle for her—made him unsuitable for the thunder and lightning she requires for emotional involvement. I don't believe that disinterest is intentional, though. We all take those close to us for granted, from time to time, without meaning harm.

In the tragic turn of events, Mikhail manages to work the situation in order to stay with Sergei. Is it just that the A.I. is too smart to be disassembled (like it claims), or do you think there's more under the surface, maybe something akin to feelings for its former Captain?

As I said before, at its core, this is a love story. Of course, self-preservation is at work, too, but my intention was to suggest that there is no logic to who we, as thinking beings, are attracted to, as friends, as lovers or extended family. Mikhail has taken on the role of wingman for Sergei, just as surely as Sergei fulfilled that role for *Chloé*.

Lightspeed assistant editor **Erin Stocks** is a writer and musician transplanted from Chicago to Oklahoma City. Her fiction can be found in the Coeur de

Lion anthology *Anywhere but Earth* (upcoming), *Flash Fiction Online*, the Hadley Rille anthology *Destination: Future*, and the *Absent Willow Review*. When she's not writing, she's reading for her SFF writing group, and can be found on erinstocks.blogspot.com.

Dividing Space by Zero

Mike Brotherton

Anything with an escape velocity greater than the speed of light is a black hole. That's the black hole's defining characteristic: Gravity so intense nothing can escape. The radius around the black hole, where the escape velocity equals light speed, is called the event horizon, the point of no return. These extreme properties provide some opportunities for nerdy bumper stickers or t-shirts, such as Black *Holes Suck, Black Holes are Out of Sight,* or *Black Holes are Where God Divided by Zero*.

That last one is from the comedian Stephen Wright, a pretty weird guy in his own right, and derives from the notion that anything within the black hole collapses down into a point of infinite density, infinitely destructive. That point is called a singularity.

That's all you get about black holes from the movies: They're dark monsters flying through space sucking up planets and stars and anything else that gets in their way. But that barely touches all the wonderful weirdness that black holes bring to the universe.

Near a Semi-Local Black Hole

Let's take a stellar-mass black hole in our own Milky Way. V-4641 Sagittarii is a binary star system that contains a regular star and a black hole joined together in their orbital dance. Astronomers believe that the most massive stars exploding as supernovas can leave behind collapsed cores. Any core more massive than about three times the mass of our own sun form into black holes.

Stellar mass black holes like this have a number of extreme properties that make them among the weirdest places in the universe. The first is the fact that gravity depends on distance, and the differences in the pull of gravity on the near side of an object compared to the far side is known as a tidal force. Stellar black holes possess wicked tidal forces that rip apart anything approaching too close like taffy. Illustrations in books and animations in documentaries show astronauts being stretched out like Mr. Fantastic. How do they survive like that? The short answer is that they don't, not without science fictional technology like "tidal-gradient compensators" or the like. The astronauts would be pulled apart in a stream of blood and guts as in Larry Niven's classic story "Neutron Star" (another dense object with wicked tidal forces), putting the worst scene in the movie *Event Horizon* to shame.

But while tidal forces can be extreme around black holes, they're not totally alien. Milder tidal forces are

visible here on Earth to people who live on the coasts and understand the moon's effect on the oceans. Black hole tidal forces could make for gory pictures, but other things that go on near a black hole are much stranger.

The Weird Gets Weirder

The basis of Einstein's general relativity is that that a gravitational field is indistinguishable from acceleration. If someone in a room with no windows were being accelerated through space at 9.8 meters per second every second, and they dropped a glass, it would crash to the ground at the same speed that a dropped glass on Earth would. If they jumped, they'd rise up and fall back down the same way they would on Earth. In other words, as long as that person didn't open up a wall and look out a window—they'd think they were still on Earth, being held to the floor by gravity.

The gravitational field at the event horizon has a lot of similarities to pushing light speed, with a similar warping of space-time. If you were to callously toss your least favorite astronomer into a nearby black hole to watch him fall in, for educational purposes only, of course, two bizarre effects would become apparent.

First, he or she would experience gravitational time dilation. Time appears to pass more slowly for someone

deeper in a gravitational field. Normally this effect isn't large, but black holes are good at pushing effects to extremes. His watch would slow down, and he would appear to move more slowly. Basically, it would be like watching a slow motion Zack Snyder action sequence as in *300*, only the cry would be "This is a black hole!" as our guinea pig falls in. And, approaching the event horizon, the slow motion would become infinitely slow. Now, our intrepid educator would experience the passage of time normally, but, from a safe distance, he would appear to stop, frozen in time at the event horizon, never quite falling in.

A quick aside. Before John Wheeler coined the term "black hole," the term "frozen star" was in parlance. The collapsing core of a supernova would be seen to slow and freeze in time as it reached its event horizon. It's not clear that every black hole was formed from a collapsing star, so "frozen star" might not be a good term, generally speaking, and certainly stars are not cold and frozen like ice, so it's no wonder the mysterious phrase "black hole" won out in the end, although apparently it doesn't translate well into French. (Yeah, it means something dirty.)

Why Black Holes are Black

So, if everything falling into a black hole slows down and never quite appears to fall all the way in, wouldn't that mean that black holes aren't black? Wouldn't they look like some mishmash of everything they ever swallowed?

The short answer is no.

This is where the second seriously weird effect kicks in: Gravitational redshift. Imagine our poor astronomer trying to explain what's happening as he falls toward his doom, signaling with his blue laser pointer (he's on the cutting edge of technology). As he approached the event horizon, we would notice the color of his laser pointer changing. Different colors of light have different frequencies—blue being the most energetic. The frequency of any beam of light is the number of times the peak—or the trough, or the middle—of the waves pass a certain point in a certain amount of time. As time dilation occurs, the number of "peaks" that pass by in a certain amount of time decreases, and the frequency of the photons flying toward us would decrease, their wavelengths also being stretched out, losing energy. Blue photons, the most energetic visible-light photons, would shift along the spectrum, toward green, then yellow, orange, red, and into the infrared and beyond. That redshifting, toward lower energy and redder colors on the spectrum, would continue on through radio waves until

individual photons would be so stretched out with such a low frequency that they effectively vanish.

At the event horizon, the redshift would become infinite and the laser would fade to black.

Black Holes Weirdness for Real and for Fun

Gravitational time dilatation and redshift are odd effects. They are so entirely foreign to everyday experience that they may seem the product of imagination rather than realistic effect. Incredible as they are, they have been verified in experiments here on Earth. Earth has a pretty measly gravitational field compared to that near a black hole, but we have the technology to measure the effect. Atomic clocks based near the Earth, and therefore in relatively high gravity, show different times than atomic clocks in low gravity far away from the Earth. Lasers do change color. Einstein's predictions are matched perfectly.

Black holes may seem entirely destructive, but they're not necessarily the malignant entities we see from the outside. It has been proposed that regions of stability that might exist inside rotating black holes, that they might be havens for alien civilizations to persist unmolested by the rest of the universe. Somewhere inside the event horizon might be sanctuary.

Black holes are fascinating and excellent fodder not only for science but also for science fiction. In some ways, they're better explored in science fiction. While astronomers have only been discovering and studying black holes for a few decades in the most basic of ways, their wonderful weirdness can be enjoyed in fiction in all the infinite ways writers can imagine. Mathematicians may not like dividing by zero, but when nature does it, it's fun, and writers can do it, too.

Mike Brotherton is the author of the science fiction novels *Star Dragon* (2003) and *Spider Star* (2008), both from Tor books. He's also a professor of astronomy at the University of Wyoming and investigates active galaxies using the Hubble Space Telescope and nearly every observatory that will give him time on their facilities. He is the founder of the NASA and National Science Foundation funded Launch Pad Astronomy Workshop for Writers, which brings a dozen award-winning professional writers to Wyoming every summer. He blogs about science and science fiction at www.mikebrotherton.com.

Frost Painting
Carolyn Ives Gilman

Soon after Galena Pittman's plane landed in Williston, North Dakota, she began to pick up nuggets of valuable information. To wit:

1. They really listen to Country Western music in the country west. Monotonous, whining hours of it, in fact.
2. Edible vegetables are as rare there as art critics.
3. Don't depend on public transportation if you want to get somewhere before dehydration sets in.

"I'll just catch a cab," she said to the woman at the ticket counter in the one-room Williston airport. The woman was dressed in the polyester pant suit all small-town females seemed required to wear, and she had that rural look of certainty that she knew how the land lay. Right now she was regarding Galena as if she were a six-year-old who needed life explained to her.

"The cab drivers will both be at home," she said.

"*Both*?" Galena said.

"It's suppertime," the ticket woman said, efficiently piling up papers.

She cast an eye over Galena, taking in the stylish bolo tie with the ceramic cactus pin, the wide-brimmed hat with the quail feather, the hand-painted cowboy boots. Her left eyebrow rose.

"How am I supposed to get to the motel, then?" Galena said. Outside, there was nothing in sight but range land. It was going to be a long walk.

At last the woman sighed. "I'll give you a lift."

Climbing into the woman's pickup, it occurred to Galena that the context had changed the message of her clothing since she had left Chicago that morning. Normally, she took pride in dressing with the kind of riskiness that said to onlookers, "This is a trained professional. Do not try this at home." But here the cultural referents were different.

"I suppose you think I'm intending to be satirical," she said as the truck thudded across cattle grates onto the highway, bouncing her off the seat. "Actually, I'm making a kind of reflexive commentary on the banalization of the Western motif in the mass market."

No reaction.

"It's a statement on Eastern use of Western symbols. I'm satirizing us, not you."

"You heading for the Windrow Mountains?" the woman said.

“Yes.” Galena was surprised to be found out so quickly.

“I figured. You’re the type.”

The type? Galena would admit to being many things, but not a *type*.

“We’ve been getting a lot of you through here,” the woman went on. “Arty types.”

Kooks. Weirdos. Galena could almost hear the woman thinking the words. “I’m not going there to stay,” she said. “Joining a hive-mind’s not my thing. I’m not a Californian.”

“Uh-huh,” the woman said.

There was something like a siren that went off in Galena’s mind at times like this. It was whooping, *wrong*, *wrong*. She had made a fool of herself again. It was like a career.

The next morning when Galena picked up the white rental Hyundai at the Chevrolet dealership, the boots and bolo were gone. Even so, the car dealer spotted her right away. Guessing where she was bound, he turned suddenly reluctant to rent her the car.

“Look, I’m just going there to see a friend,” Galena said reasonably. “I’ll be back Sunday.”

“So you say.”

“You want to see my plane ticket?”

“You all have plane tickets.”

Exasperated, Galena said, “Have they ever heard of tolerance in this town?”

“It’s easy for you East-Coasters to be tolerant,” the man said. “You don’t have to live near them. I’ll tell you this: If those weirdos ever decide to come out of the mountains, we’re going to be ready for them. That is, if you liberals haven’t taken away our guns by then, too.”

Galena would have gladly gotten into a scrap with the man, but there was no time. She ended up leaving a signed credit-card slip with him to cover the cost of retrieving the car, if necessary.

Unfolding the map on her dashboard, she saw that across the Montana border southwest of Williston was nothing but blank space with anemic gray lines wandering through it. “Road condition unknown,” the map said helpfully. “Hi ho Silver,” Galena said to the Hyundai. Then she put on her sunglasses and prepared to cross the Great Plains in a Korean rattletrap.

“I hope you appreciate this, Thea,” she said.

“Galena Pittman,” a rival columnist had once written, “is aptly named for a poisonous mineral.” The phrase had amused Galena’s colleagues so annoyingly that she had

adopted it, mentioning it so often and laughing so hard that everyone began to realize it stung her.

In fact, Galena had been stinging since she was born. Long ago she had realized she was the world's pincushion, a target for every petty mortification, every nettling slight the world could invent. She could chew her cuticles raw thinking of the condescensions she had to endure in a given day, the premeditated cruelties of cabmen and bureaucrats. The only defense was to attack earlier and more wittily, to wear a coat of banter thick enough to keep the pins away. It rarely worked.

Her mother had a favorite saying: "If you make a bed of nails for yourself, you'd better lie on it, and like it." Galena had spent a lifetime casting barbs at that slogan, trying to find ways to disprove it.

In college, she had wanted to be an artist; but she had soon learned that she couldn't bear to see others looking at her work, thinking thoughts she couldn't control. She had tried to explain herself so intrusively, and had annoyed so many people, that it finally dawned on her that the explaining was all she was really good at. So, unable to be criticized, she became a critic.

Galena had actually fallen in love with Thea Nodine's art several minutes before she fell in love with the artist herself. It had happened on a day when her landlord had

decided to repair the plaster without any notice, and she had spent most of an hour calling everyone she knew to come help her move furniture, receiving only one recorded message after another. At last, where friendship failed, money had to take over. The people at Hank's Hauling had been only too happy to help, once they had taken her Visa number hostage. By evening her apartment was in chaos, and Galena was in a state of advanced disappointment with the world. She wouldn't have gone to the opening if she hadn't been paid to cover it for the *North Side Review*.

Standing there in a haze induced by exhaustion, cheap Chablis, and whatever nutrition came from Brie on rice cakes, Galena saw her first frost painting. It was a feathery, crystalline abstraction on glass—almost an image, like an elusive memory. It had been taken from its refrigeration box and set in a wooden stand for display, and the overheated gallery air was beginning to melt it. She stood and watched as the painting slowly turned to water from the outside in. She couldn't figure out why she found it so moving till someone behind her said, "That's how I feel." Galena realized it was how *she* felt, too—like a fragile thing being destroyed bit by bit, aging and perishing as everyone stood and watched. She stared until the painting was no more than a sheet of glass covered

with tears, and all that was left was a memory of beauty that had changed and passed on, like time and lost youth.

She asked the gallery owner about the artist, and he said, “Oh, you’ve *got* to meet Thea. She’s simply an angel. All her work is perishable, you know. She works with the craziest things—sand, smoke, ice, sparks.”

Thea was dressed in an oversized lumberjack shirt and jeans, her tangled, brown hair falling around her shoulders. At first Galena wondered what kind of shtick this was; but a look at Thea’s young face immediately told her that it was no shtick—the girl was simply unaware of the impression she made. Galena was suddenly seized with an urge to cherish this wisp of smoke, to protect it from all the winds that might dissipate it, to keep it young forever.

She gave Thea a ride home that night. The artist was living in a squalid, firetrap loft with five others, sleeping on old mattresses and cooking on a portable grill. The next morning, Galena bustled to the rescue, transplanting Thea into her apartment. The girl came willingly enough, but without the gratitude Galena had expected. She had yet to learn that Thea was oblivious to her environment, existing like an air plant with no soil, just on sunlight and inspiration.

Galena made the nest, brought in the money, and kept

out the world. Thea brought into her life almost-forgotten pleasures like scented soaps and silk pajamas, pearly Christmas ornaments, and pomegranate seeds. Their relationship had all the hallmarks of permanence: an adopted cat, Chinese takeout in front of the television, Saturday morning errands, repainting the bedroom, bike rides in the park. Life was so normal, so trustworthy, it lulled Galena into forgetfulness. She almost became amiable.

She missed the signs of Thea's restlessness at first. In hindsight, the whole shift to wind sculpture had been part of it—a yearning attempt to grasp impermanence again. In that sunny spring Galena would come home to find her staring at the vortexes formed in plexiglas tubes by the wind machines. They were like miniature, multicolored tornadoes, made visible by smoke or sand or bubbles. They had never looked strong enough to sweep any Dorothys off to Oz. Or Montana.

GAS—CASINO—ALIEN CURIOS, said the hand-painted roadside sign. Galena lifted the sunglasses onto her forehead; in the rear-view mirror she saw they had left white circles in the dust on her face. Without the green tint of the lenses, the landscape looked bleached into

shades of gray. Eroded hills, tufted with buckbrush and jackpine, cooked under the glaring sky. Ahead, hovering above the distant horizon, was a brushstroke of white—not clouds, but the snow capping unseen mountains.

She turned the Hyundai into the gravel parking lot in front of the gas station. The air conditioner sighed wearily as she killed the engine. When she twisted to get out, a sharp pain caught her unawares. She waited, sweaty, till it was gone, thinking: *Serves you right for growing up*.

Outside, the heat radiated off the yellow ground. In a dust-caked pickup by the gas pumps, a young woman waited with a child, her wispy blonde hair blowing in the dry wind. The bumper sticker on the truck said, IF YOU DONT WANT HEMORRHOIDS, GET OFF YOUR ASS. A Western sentiment, Galena presumed.

A wiry, bowlegged man was buying cigarettes at the counter inside. Galena wandered down the aisle of dusty tourist trinkets: Rubber tomahawks, dribble glasses, ashtrays with toilet humor on them.

The door closed and Galena became aware of someone watching her. A woman stood motionless at the head of the aisle, not unlike one of the rock formations outside: A wind-scoured, lumpy shape with a cracked complexion that looked hard to the touch.

“Where are the alien curios?” Galena asked, thinking

that the woman herself looked a little like one.

The woman pointed to a tabletop display case at the end of the aisle. Galena had to wipe the dust off the glass to see inside. She had expected plastic E.T.'s, but instead saw an assortment of lumpy concretions like fossilized organs. The shop's proprietor eased in behind the case, moving her bulk with uncanny silence. Without asking, she opened the case, took out one of the rocks, and handed it over. It was translucent, like onyx, and threaded through with red-brown veins. Galena suddenly had the feeling she was holding a giant eyeball, and put it down on the counter, a little revolted.

"How do you know it's alien?" she said to play along.

"It sure's hell ain't natural," the woman said. She had a breathy cigarette-voice.

"So what is it? A transdimensional doo-dad?"

"One of the things the Dirigo leave behind."

Galena said, "I thought the Dirigo looked like strings of Christmas lights." That was how *Unsolved Mysteries* had it, at any rate. "No one ever said they left turds."

The woman drew another object from the case and cradled it in her palm. It was the color of a kidney, and shaped a little like one. Its surface was slick, as if wet. "The aliens didn't leave these. The people that let them take over did."

So this was the much-publicized art created by the Windrow Mountain colony. It was not up to Thea's standards. Galena felt partly relief, partly anger that Thea could have been hoodwinked into participating in this travesty.

The woman's mineralized skin did not show a flicker of emotion. "You going up there?" she said.

"Yes. I've got a friend there."

"You think. There's nothing human living up there."

There's nothing much human down here either, Galena wanted to say; but she curbed her tongue.

When she emerged from the shop, a wind brushed by, scented with sage. She turned to look south, where the Windrow Mountains still hovered like an unkept promise on the horizon. "Don't leave, kid," she whispered. "I'm coming."

The reports from Montana had fascinated Thea from the start. There were many versions from the beginning. Remote Montana community taken over by aliens. Demonic possession in Montana wasteland. Mystery Montana disease baffles scientists. Galena scoffed at it all.

After anthropologists at the University of Montana

began to investigate, the explanations still metamorphosed to suit every paranoia. It was a type of mass hysteria. It was a scandalous case of environmental contamination. It was genetic inbreeding. It was a secret government experiment. One debunking journalist concluded that the "victims" were in fact members of a harmless New Age religious community who were being stigmatized by society as "ill" for their nonconformity.

The explanation of the victims themselves never changed. The Dirigo, they said, were enabling them to create art of a type never before imagined.

It was the art that riveted Thea's attention. As pictures finally filtered out, Thea bought all the magazines and pored over them. "Just think," she said, "I could work in real wind, real lightning, if I had their inspiration."

"If you had their inspiration, you'd be in a loony bin," Galena said.

But it did seem as if Thea's creativity was lagging that spring. Her studio was cluttered with unfinished work; it was over a year since she had held one of her famous shows that drew crowds to see the self-destroying art. As her comfort increased it seemed her drive faded. Galena worried that her own happiness was poisoning the well from which it sprang.

One morning when Galena, ready to leave for work,

leaned over the bed to kiss her partner goodbye, Thea looked up out of the rumpled bedclothes and said, “I’m going to Montana.” Galena laughed, brushed the scattered hair out of Thea’s face, and said, “Ride ‘em, cowboy.”

When she got home that evening, Thea’s suitcase and backpack were waiting by the door. The truth smashed all the elaborate structure of Galena’s security. Contentment had come to her so late, so unexpectedly, that she had never thought it, too, could be perishable. She followed Thea around the house, asking questions in a voice like a lost child.

“How can I get in touch with you?”

“What are you going to do there?”

“How long will you be gone?”

“Why are you doing this?”

“When will you know?”

“What about me?”

“What about me?”

To which Thea could only answer again and again, “I don’t know.”

And that was all Galena had ever gotten out of her. She consented to drop Thea off at the airport, but wouldn’t go in with her, and they didn’t part with a kiss, or even a hug.

The road deteriorated as it began to climb. The shoulders were first to go, then the paint, till all that was left was a line of asphalt about as flat as a strip of cooked bacon. Galena's stomach was running on empty, but a touch of nervous nausea kept her from stopping to eat the granola bars she had brought. She didn't know how she was going to find Thea, and she didn't want to be wandering the Windrow Mountains all night.

The mountains wore a skirt of pine forest. The road veered to and fro through the still trunks till Galena began to suspect it didn't know where it was going. Down under the canopy of needles the air was dark as twilight, though the sun had to be in the sky, somewhere.

She rounded a corner and laid on the brakes. Ahead, the road was blocked by a fallen tree. A large yellow sign said, PRIVATE PROPERTY. TRESPASSERS WILL BE PROSECUTED. The sign was pockmarked with bullet holes.

She got out to survey the problem. The air was surprisingly cool; she must have climbed in altitude. The tree turned out to be just a poplar sapling, more leaves than trunk, felled by a chain saw. She seized a branch and dragged it across the asphalt, out of the way.

"If you want to keep me out, you'll have to try harder

than this," Galena said to the unknown woodsman.

The effort had winded her, and she sat sideways in the driver's seat a while, her door open on the chill, quiet air. At first she thought that her tired eyes were playing tricks; but no, the shifting points of light were real. Off in the forest, down the winding corridors of pines, some people were carrying candles, or flashlights.

"Excuse me," Galena called out, getting up. "Can you give me some directions?"

The lights winked out. Piney silence surrounded her. Only then did Galena remember the reports—floating strings of lights sighted; gauzy veils, unexplained. She realized she was standing with one arm outstretched, as if hailing a cab. With a nervous laugh at her own absurdity, she headed back to the car and the security of self-examination. One's first brush with the paranormal ought to have more dignity than this, she decided. In her mind she composed the headlines. CHICAGOAN TRIES TO CATCH RIDE ON UFO: "I THOUGHT IT WAS A CAB," CITY SLICKER SAYS.

The road plunged down a ravine, then abruptly emerged from the trees into a barren valley. The setting sun touched the sandstone cliffs, a vivid orange. Lines of erosion made the rock face look like an ancient bas-relief, so worn away that the original sculpture was barely

visible. Galena stopped the car to study it. She could almost see figures in motion—no, an inscription in flowing characters. It reminded her vividly of something. It was on the tip of her tongue: She would remember in a second.

It was just a cliff. Frowning at the illusion that had drawn her briefly out of herself, she put the car in drive again and followed the winding road down into the heart of the valley. Rock formations rose on either side: Twisted sandstone pillars that looked like figures hidden in stone cocoons, their proto-limbs still obscure beneath the surface. They drew her eyes, as if subconsciously she knew what shapes lay beneath. The valley floor held an army of them in a thousand poses, straining to free themselves. Galena sped through them; they towered over the little car, their shadows lying like barriers across the road.

At last the forest enclosed her again. It was dark now; she turned on the headlights. There was still no sign of any colony—no sign of humans at all. The last motel she had passed was just after noon.

At last, a light shone through the trees. She slowed, then spotted the driveway—just a dirt track, really. As she drove up it, the tall grass swished against the car's undercarriage.

It was a log house, probably built as a hunter's lodge. Leaving the headlights on, Galena skirted the stack of firewood and climbed three board steps onto the porch. The screen door creaked when she opened it to knock. It was several seconds before there was any response. Then, hesitantly, the door opened a crack and someone peered out.

It was Thea. "Hi there, kid," Galena said, as if she'd known it was going to be her.

Thea stood staring. "Galena," she said.

Her long brown hair fell in curly tendrils, uncombed but fetching. She looked more thin and waiflike than ever in a flannel shirt and jeans. Her feet were bare. Galena wanted to hug her to make sure that everything was all right, but there was something in her manner—a slight shrinking back, a wariness.

Thea held the door open. "Come in."

The kitchen table was soon strewn with the snapshots Galena had brought—mostly their cat, Pesto, doing assorted catlike things. Thea stared for a long time at one where the flashbulb made the cat's eyes light up like headlights.

"He's gotten to be a real sentimental slob," Galena

said. “After you left, he wandered around the house and cried for a few days.” So did I, she didn’t say.

“Mr. Garavelli at the dry cleaners told me to say hi to you,” she continued the patter she’d tried to keep up ever since entering, afraid of what silence might mean. “They’ve been repaving the street out front, and it’s been unbearable all summer: Nothing but dust and noise. Workers leaving their shirts on the bushes. Manly sweat everywhere.” She took a sip of the tea that was virtually all Thea could offer her; the refrigerator was almost empty. “I had to go in to Dr. Hamer for a biopsy last week. I find out the results Tuesday.”

At last Thea’s eyes focused on her. “What’s wrong?” she asked.

“Getting old, that’s what’s wrong.” *Getting old alone*, she thought. *No one to tell how it feels, no one to give a damn*. “Never mind,” she said.

At last silence fell. Inside the wood stove, a log settled with a brittle sound.

“Galena, I can’t come back,” Thea said. Her voice sounded like a guilty child confessing. “I’ve made the commitment here.”

“Sure. I understand,” Galena said, barely hearing the words. “What’s important is your work. How’s it going?” She glanced around the cabin. There was not a sign of

artistry anywhere, just worn Salvation Army furniture.

"I'm working outside now," Thea said. "I'll show you tomorrow, if you want."

"Yes. I want."

Silence again.

"I'd better get my suitcase out of the car," Galena said. There was a twinge of pain as she rose, mocking her. *Think you're brave, do you?* it said. She took care not to react. She couldn't bear to seem vulnerable.

"Sure. You can sleep on the couch," Thea said.

Galena looked at her silently. Thea wouldn't meet her eyes. "What is this, Montana morality?" Galena asked.

"No." Thea's voice was pleading. "I just can't, Galena. I don't want you to lure me back. It will be too hard."

Too hard on whom? Galena wondered. "Okay," she said slowly. "You make the rules."

Suddenly, Thea gave her an impulsive hug. "Thank you," she whispered. As she disappeared behind the bedroom door she glanced back. The light caught her eyes with an odd glint, as if the retinas were brushed metal. For a moment she looked utterly alien.

That night Galena lay alone on the lumpy couch, kept awake by wind in the branches outside, the skittering of small feet across the roof, insect wings on the window

screen. None of the soporific sounds she was used to—the roar of garbage trucks, the wail of sirens. No comforting weight of possessive cat on her feet. She wondered if Thea were awake.

This desire to be held and comforted was childish, she told herself. *You're an adult now. You know how to survive*.

Lying in the dark, she imagined a tumor growing inside her, a living thing that wasn't her, like the child she never had nor wanted. Nature had a way of getting back at people who didn't follow its rules. And reproduction was the first rule, the evolutionary imperative.

She had never made a decision to swear off men—just drifted into it, the path of least resistance. Her last attempt at a straight relationship had been a madcap fling with a sculptor. The only time they had had sex together, while she was still basking in the afterglow, he had smiled at her and said, "You look like a woman who's just been fucked."

The statement had jarred her. Why was it *she* that had just been fucked, and not *him*? He had slipped, and revealed the real reason he had done it—not for the enjoyment, no strings attached, but in order to transform her into something she hadn't been before, as if she had

been raw material he had made into something. As if he had put his mark on her, like a dog pissing on a lamppost.

From that moment she knew that for men, sex was inextricably connected to power, and always would be. No matter what they said, or how enlightened they acted, sex was dominance to them; on such an instinctual, hardwired, brainstem level they could never overcome it. And she had far too vivid a sense of her own individuality to ever imagine herself as a thing marked as a man's territory.

Thea's love had always been free of other agendas. It had never been mixed up with power, or pride, or self. It had been a spontaneous gift, unpremeditated, as if it sprang from the air between them. Galena had never had to give up being who she was in order to be who Thea loved.

She hugged the pillow to the hollow feeling in her body, wondering if loneliness caused cancer.

In the morning, Galena ate a breakfast of granola bars and tea; Thea was not hungry. By daylight, the cabin looked more dilapidated than ever. One of the kitchen windows was broken, and there was an old mouse nest in a corner. "How did you find this place?" Galena asked.

“Everyone stays here when they first come,” Thea answered. “It’s where you wait.”

“Wait for what?”

“For the Dirigo. I’ll be moving on soon.”

“On to where?”

“The colony. I’m almost ready.”

“Will you show me the colony?”

“If you want.”

Thea set out as if to walk, but Galena asked how far it was, then persuaded her to take the car. Thea looked at the Hyundai as if she’d forgotten how they worked, then opened the door awkwardly. Galena watched her carefully, suspicious.

“What do you want to see first?” Thea asked.

“What’s the choice?”

“There are work sites all around us. The Wind Clock, the Haunt, Nostra Knob.”

“What have you been working on?”

“The Flens.”

“Let’s see it, then.”

A few miles down the road, Thea suddenly exclaimed, “Stop! Stop here!”

Galena pulled over. They were high on the mountainside; on their right hand was a steep drop-off, giving them a wide view of a wooded valley that wound

into blue distance, interrupted by the out-thrusting roots of mountains on either side.

"Look out there," Thea said. "Do you see the painting?"

The vegetation on north slopes, south slopes, and valley floor was a pattern of green, teal, and umber. It was as if someone had taken a giant brush and painted the land to form an abstract of overlapping tints. "Isn't that natural?" Galena said.

"Of course not. This was one of the first landscape paintings the colony did. Here, let me drive so you can watch."

A little reluctantly, Galena got out and went to the passenger side. Thea said, "Unfocus your eyes just a little," then started the car slowly forward.

At first Galena saw a complex patchwork of sunny streaks. Then, as her perspective changed, a dark, spear-shaped wedge began to push its way into the foliage colors. As it touched each band of color, that area went suddenly dark, drab, and uniform. It had almost reached the opposite side when a cascade of rust, sienna, and lemon erupted from the spear tip and turned the landscape bright again.

The car stopped. Galena blinked out at the view, which had been transformed by traveling 300 feet along

the road. “How did they do that?” she asked. “By painting the back side of every leaf?”

“I don’t know,” Thea said. “It looks different at every time of day, and every type of weather.”

Galena shook her head. “Landscape painting. I see what you mean. Not painting the landscape, but *painting the landscape*. How many people did it take?”

“I don’t know,” Thea said again.

As they continued on, Galena looked on every prospect around her with new attention, to find more *trompes l’oeil* hidden in the leaves.

They arrived at the Flens down a rocky path. At first, it looked like a range of rampart cliffs, formed into organ-pipe pillars of a thousand dimensions. A swarm of people was at work on the cliff face, some on scaffolding anchored into the rock, some swinging on ropes. Though she tried from several angles, Galena could not tell what the sculpture was going to be.

When she asked, Thea laughed. “The sculpture is not in the rock,” she said. “The medium we are working in is wind. At sunset, the mountain above us cools faster than the valley, and a wind rushes down the slope. The Flens will catch it in a thousand fissures, and part it, till it forms a shape. We will know we have gotten it right when the rock pipes sing. It’s almost done; we are tuning it now.”

“You are making an organ from the mountain,” Galena said, struck by the strangeness of the concept.

“An organ only the wind can play,” Thea answered.

As Galena watched, the workers vacated one area. There was a puff of smoke, then an echoing explosion.

“They use dynamite?” Galena asked.

“We use anything that will do the job,” Thea answered.

The workers moved back into the dynamited area, their movements efficient and coordinated. Galena could see no one in charge, hear no shouted orders.

“Who designs the artworks?” she asked. “Who is in charge?”

Thea looked at the ground and shrugged.

“Thea?” Galena said.

“You will just misinterpret it,” Thea said.

“Try me. Come on.”

“The colonists just *know* what to do. They feel what’s right. Imagine having the skill to produce each effect deliberately. Imagine thinking, ‘I need pathos here, or an ominous effect,’ and knowing exactly what you have to do to create it, as if it were being whispered in your ear. And everyone else knows the same.”

“Kind of like having a muse?”

“That’s right. The Dirigo are our muses.”

Gently, Galena said, “You never needed to use anyone else’s inspiration before. You never worked by anyone else’s plan. That’s what made you so good.”

Nervously, Thea brushed a strand of hair behind her ear. “I was never as good as you thought I was.”

Galena was about to protest strenuously, but Thea said, “You blew me up so big, nothing I could do would ever justify it. Everyone’s expectations were so high.”

“Thea, kid, you deserved it!” Galena said.

“You see what I mean,” Thea said, then turned back toward the car.

“So is that my sin?” Galena shouted after her. “Having faith in you?”

Thea didn’t stop or answer. When they both got back to the car they sat a while in silence. Galena considered, and rejected, half a dozen strategies: Conciliatory, wounded, encouraging, authoritative. None of them were sufficient to the way she felt.

When Thea finally spoke, it wasn’t about Galena at all. “Here, no one makes the art for any reason but because we want to.”

They drove on to other sites. The art was everywhere. It was fashioned from streams and sand, shadows, lichen, and rain. In one place a flight of swallows was an intermittent part of the sculpture. After a while it was

impossible to see the landscape as a backdrop, an accidental thing.

"Supposing these Dirigo were real—" Galena started.

"They *are* real," Thea said.

"Okay, okay. Are they trying to tell us something?"

"I don't know. You're the one who gets messages from art."

"Do they talk to you?"

"No. Not the way you mean. We don't know what they want. We're not even sure they know we're any different from the trees and rocks. Except—"

"Yes?"

"Some people feel they're trying to remember something. Something they once knew long, long ago, but now they've forgotten."

"Like us all," Galena said.

The last site they visited was what Thea called the Pivotary. They drove up a long gravel road that climbed past the trees into a cold, bleached world where the very air seemed purified and rare. Through the afternoon an ache had been growing somewhere between Galena's back and gut; when they reached the end of the road she parked and sat a while, waiting for it to subside. The sun was low, but above them the sky was still bright.

They walked side by side up a gravelly path that

curved between two spurs standing out from the mountain like rock gates. Beyond them, in a sheer-sided bowl, lay a mountain lake, its surface so perfectly still it mirrored every rock around it. When they came to a halt beside it, and their footsteps ceased, silence settled in. The air seemed so crystalline it might break at a touch.

In a hushed voice, Thea said, “This is where the Dirigo live. They’ve been here for eons, maybe since the beginning. It’s possible that the Blackfeet Indians knew about them. We think other humans may have known, once, in other times and places. We come here to invite them in. Don’t worry, they can’t inhabit anyone who is unwilling. You would have to go into the lake to make them part of your life.”

“Like a baptism?” Galena said.

“That’s right.”

There was a silence. At last Thea said hesitantly, “You could do it, too. You could join us.”

“Oh, Thea. When will you learn? I don’t have the talent for art.”

“You could. There are people in the colony who never made a thing before coming here.”

“So that’s what the Dirigo offer? Instant talent?”

“Vision. Creativity. A feel for the elements. If that’s talent.”

“What a deal,” Galena said, stirring a pebble at her feet. “You’d have to be crazy to turn it down.” She glanced sidelong at Thea. “But what’s the catch?”

“There are only catches in a human context. Catches belong to the outside world.”

“The human world, you mean. Catches are part of being human.”

“All right,” Thea said. “The catch is, I have to hurt you, by leaving you behind.”

They stood looking at each other then—communicating, Galena thought, for the first time, though not a word was said. *I need to say it aloud*, Galena thought. *I have to admit how badly I need her.*

As the light shifted with the setting sun, it caught Thea’s eyes, and the retinas reflected through, opaque as mirrors, beautiful as gemstones. A chill went down Galena’s spine. She grasped Thea’s hand. It felt cold.

“Have you already gone into the lake?” she asked.

Thea nodded. “Three weeks ago.”

“Can you still back out?”

“I don’t want to.”

She was the same, but unknowable. Unchanged, yet wholly different. “What did I do to make you want this?” Galena said.

“It has nothing to do with you.”

It couldn't be true, Galena thought. Somehow, this was her fault.

"Look!" Thea said, pointing out over the lake. "They've come."

The sun had set, and darkness leaped up from the ground. But the sky was still light, and the lake, reflecting it, glowed azure in the twilight. Above it, a constellation of sparks danced, firefly lights cavorting. Around them the air shimmered as with heat waves. Galena glimpsed something like a shred of iridescent gauze, gone as soon as she focused on it.

"What are they doing here?" Galena whispered. "What do they want?"

"The art," Thea said. "It's all they want. To make beautiful things. They can't do it themselves; they need our hands, our ingenuity."

She was gazing at them entranced. *I am losing her*, Galena thought.

The valley was growing dark; now faint streaks of colored light flashed and disappeared above the lake, like an aurora, or a reflection from a light that wasn't there.

Galena took Thea's hand firmly in hers. "Come on," she said, "I'll drive you home."

Following the headlights down the steep road, Galena remembered how, in the days when Thea had still gone

down to her old studio to work, Galena had picked her up after work, to drive home. Sometimes she would climb the steps and hear the artists who shared the space laughing together uproariously, like teenagers. When she entered the room, the laughter would cut off self-consciously. Even if she told them to go on talking, the atmosphere would turn stiff and formal, as if Teacher were watching. It had made Galena hate to go there after a while, just to feel out of place, unwanted.

There was an ache in her gut that said, *No more future, no more chances*. Always the future had been there, a sketchbook where she could try out new scenarios. Now experimentation was done; only action was left.

She came to the main road, then retraced the way back past the turnoff to the Flens, past the landscape painting, speeding faster with every mile. As pine trunks flashed by in the darkness, Thea said, "That was the turnoff to the house. You missed it."

"I know," Galena said.

The road curved and plunged downwards, into the valley of the stone shapes. Thea said tensely, "Stop, Galena. I can't leave."

"Yes, you can," Galena said. "And I think you'd better, before they've brainwashed you completely."

She pressed down on the gas, wanting to get past the rock formations that loomed in frozen motion over the road. The passenger-side door opened, and Galena heard the pavement rushing past. She reached over to grab Thea's arm, only to feel it pull away. The loony girl was actually going to jump. Galena braked hard, and the car slewed around on loose gravel. For a moment she had a terrifying out-of-control feeling. Then the car came to rest in the roadway, facing back the way it had come. The headlight beams pointed crookedly into the dust and exhaust. The passenger seat was empty.

Galena left the car door open and walked down the harsh beams of light, searching the shoulders for a sign, her stomach muscles clenched. Then, ahead on the roadway, she saw Thea's silhouette, walking steadily away from her. She sprinted to catch up.

"Thea!" She grasped the girl's arm and forced her to turn around. "Are you—" The headlights caught Thea's eyes and they shone back, bright and preternatural.

Instinctively, Galena stepped back. Then a desperate sense that she was losing overcame her, and she grasped Thea by the shoulders. "Fight them, Thea! Don't surrender, don't let them control you. Be yourself."

A wan smile crossed Thea's face, too wise and knowing for her young features. "Myself?"

“Yes.” Galena clutched her tight. “The Thea I knew.”

Thea’s voice was maddeningly adult. “The Thea you invented, you mean. I know all about being dominated, Galena.”

Galena loosed her grip, deeply stung. “That’s not true! All I ever wanted was for you to be yourself.”

“Then let me go,” Thea said.

“Not to give up your freedom,” Galena said stubbornly. “Not to become something that’s not even human.”

“The only humanity I lose is the ability to make things ugly.”

“Oh, isn’t that great,” Galena said, bitingly sarcastic. “Why don’t we all join the Dirigo, then, and have a world of people who want nothing but beauty. A world of saints and artists.”

“Why not?” Thea said.

There was a cloud of sparks around her head, like a halo in a medieval painting, but they cast no light on her features. Half to them and half to her Galena said, “Because it wouldn’t be a human world, Thea.”

There was a silence. The rock shapes around them seemed to be listening. “Then I don’t want to be human,” Thea said.

She was leaving her face, retreating back behind those

eyes that revealed nothing. When she turned again to walk into the dark, there was no one left to stop.

The shoal of silver slivers that had hung above Thea's head did not leave with her. They still hung in the air, darting about in school formation.

Galena knew that she too could wear a halo of stars if she only consented. There was a heavy lump inside her gut—her own inhabiting being, eating her away from inside.

"Get out of here!" she shouted at the pinprick lights above her. "Let us be! You've got no business trying to make us better than we are."

Her footsteps sounded heavy and corporeal as she walked back to the car. When she had turned it around she paused with her foot on the brake, caught on a snag of grief. For a moment she rested her forehead on the steering wheel, then shifted blindly into drive.

She had her comebacks ready by the time she got to Williston. When the car dealer's eyebrows cast aspersions her way, she said, "The Dirigo didn't want me. I guess they saw I was already alienated enough."

She would have been ashamed to commit a pun in Chicago, but this was North Dakota.

The sweaty, overly familiar salesman in the seat next to her on the plane found out where she had been and said jocularly, “Did you see any aliens?”

“Not as many as I’ve seen since coming back,” Galena retorted.

As they circled high above the fumes and grime of O’Hare, caught in traffic, she looked down at the barren mess humanity had made of the landscape and imagined it all melting away like one of Thea’s frost paintings.

It would never happen. If humanity were offered salvation on a silver platter, someone would probably just mug the messenger.

She shifted, feeling the bed of nails beneath her.

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Carolyn Ives Gilman has been publishing fantasy and science fiction for twenty years. Her first novel, *Halfway Human* (Avon/EOS 1998), was called “one of the most compelling explorations of gender and power in recent SF” by *Locus* magazine. Her second, *Isles of the Forsaken*, will come out in August 2011. Her short fiction has appeared in *Fantasy and Science Fiction, The Year’s Best Science Fiction, Bending the Landscape, Interzone, Universe, Full Spectrum,* and *Realms of Fantasy*. She has twice been a

finalist for the Nebula Award.

In her professional career, Gilman is a historian specializing in 18th- and early 19th-century North American history, particularly frontier and Native history. She lives in St. Louis and works for the Missouri History Museum as a historian and curator.

Author Spotlight: Carolyn Ives Gilman

Robyn Lupo

This story has it all; art, aliens, rural folk and a road trip. Can you tell us a bit about the genesis of this story?

I'd been doing a lot of driving through the West, and the badlands along the Dakota-Montana border got into my brain. The landscape there is so strange and sculptural already, it didn't take much of a leap to imagine it as deliberately created. But what really made the story happen was that Galena came to me in a flash, fully formed and demanding that I should write about her. I have no idea where she came from, but I was not about to argue with her.

Impermanence features heavily in "Frost Painting." What was it about this particular theme that drew you in?

I suppose I wrote this story at the stage of life when you realize that the world you grew up in is going away. Things that shaped you start vanishing without your

permission, and you can't help grieving for them, and for the person you thought you were.

I also work in a setting where impermanence confronts me every day. I'm a museum curator, and our job is to guard irreplaceable things in order to preserve them for the ages. But you can't, of course. Things crumble and decay no matter what you do. So we ultimately have futile jobs, battling entropy.

The sculpture, as well as the evocative imagery in "Frost Painting" made me wonder if you're involved in other forms of art besides writing, such as painting, sculpture, etc. Do you work in other media?

I wish. No, like Galena, I'm more of an appreciative observer. The only art form I engage in, other than writing, is the creation of exhibitions, which most people don't even think of as art. I think of exhibitions as theater—a stage setting on which artworks and artifacts are the performers, and where the audience gets the experience by moving though space as the mood changes around them. That's the ideal, of course. The reality is that you never have enough money, space, time, or talent to create the exhibition that's in your head. I think "Frost Painting" is a little bit about wish fulfillment—inventing a setting

where artists could actually achieve what they imagine.

I was hit hard emotionally by the relationship between Galena and Thea—and how it is revealed to Galena that she had become, or was all along, the type of person she wanted to avoid in her previous relationships. What sort of message would you like the reader to take home from Galena and Thea's relationship?

It would be presumptuous of me to say what anyone should take home. I think reading a story is a creative act just as important as writing one, and every reader creates a different story. I just drop hints; the readers do the hard work. But that said, I do seem to write a lot of stories about people breaking their hearts trying to control things that can't, or shouldn't, be controlled. Honestly, I don't know why.

Can you tell us what you're working on now?

I have a new novel coming out in August, called *Isles of the Forsaken*. It's the first part of a two-book fantasy novel about an isolated nation of islands on the brink of a

revolution. It’s all about empire, rebellion, sacrifice, and love.

Robyn Lupo has been known to frequent southwestern Ontario with her graduate student husband and elderly dog. She writes, reads, and plays video games. She is personal assistant to three cats.

Dissolving the Wall Between Art and Science

Graeme McMillan

Science fiction fans have long known that art and science aren't as deeply divided as they're made out to be. We've seen science concepts jumpstart a story that lead its readers to consider the universe in a new way. And we've seen fictional visions of the future inspire scientists to work towards a world in which fiction—be it space travel, medical science, or just hospital beds that look like the sick bay gurneys in *Star Trek*—are possible.

And yet some are still convinced the divide can't truly be breached. But why? Consider this argument: Marcel Duchamp, a French artist who challenged conventional artistic standards of his day, claimed a urinal was art, and entitled it "The Fountain." But the urinal wasn't shaped by an artist's skill and a paint brush. It was the cold need to design an efficient, watertight, and easy-to-clean shape. Duchamp's art was shaped by physical restrictions (and some chutzpa), not the just rarified need for aesthetic appreciation. Art and science were one. More and more artists and scientists are reinterpreting art and science, or rather, dissolving that line altogether.

Science in Art

Theo Jansen, a Dutch artist and kinetic sculptor, put the crossover best in, of all things, a commercial he appeared in for a car company: “The walls between art and engineering exist only in our minds.” Sounds like something only an artist would say. Jansen’s work, however, dips deep into mad scientist territory. “Since 1990,” Jansen explains on his website, “I have been occupied creating new forms of life. Not pollen or seeds but plastic yellow tubes are used as the basic material of this new nature. I make skeletons that walk on the wind, so that they don’t have to eat.”

Watching Jansen’s “Strandbeests”—his name for the kinetic sculptures that appear to walk once caught by the wind—move across the ground, it’s easy to convince yourself that you’re watching skeletons of imaginary creatures. Jansen engineers sails that pump wooden or plastic legs so a beast scuttles across sand like a lobster. He designs a cardboard beast with many different sections that catch the wind like pinwheels and rolls the creature forward. He even makes desert beetles with shells covered with solar panels. The most successful of his beasts are incorporated into the next generation of design, as if the creatures evolve over time.

Those who prefer physics over biology only have to

look up at the night sky. Even as unknown pin-pricks of light, the sun and stars have inspired artists for thousands of years. As scientific knowledge became more advanced, art kept pace. Early artists made gilt models of the solar system, using data to make art. Later artists made the rings of Saturn and the red spot of Jupiter into iconic images. Today NASA releases pictures of galaxies light years away—after they've been colorized and detailed by artists. This colorization process is not a step away from reality. It's the only way NASA can let people see these images. Current observatories measure neutrinos, gamma rays, ultraviolet lights, infrared, and radio—none of which can be seen by the human eye. Science discovered a new way to look at the universe, and art made it visible to human eyes.

Art in Science

Jansen's work and NASA images give the impression that science and engineering can inform art, but surely art can't guide science, right?

Consider Leonardo DaVinci and the sketches he left behind for inventions that would only be realized centuries after his death. His ideas were ludicrous flights of fancy at the time, but the ideas of his flying machines,

tanks, and submarines were taken up by scientists and engineers in coming centuries and made real. According to Hunter Cole, a geneticist and internationally-shown artist, the collision of disciplines isn't entirely unexpected. "They have a lot in common," she told *Chicago Art Magazine* last year. "People associate art with creativity and whimsy and people associate science with facts and structure, but you actually need to be very creative as a scientist." She should know. Cole created line drawings with bioluminescent bacteria, took time-lapse photos of the way the bacteria grew from her original art, and set them to music based on the protein sequences found in the bacteria.

So if art and science both begin with people interacting with the world in a creative way, where does that creativity lead? Joe Davis, called the "éminence grise of the bio-art movement" by *The Washington Post*, a sculptor who has taught at both the Rhode Island School of Design and MIT. He has embedded artwork into bacterial genomes and created a device to turn light information into sound so that the viewer can "hear" cells. Davis has built an airplane powered by frogs' legs, encoded poetry into fruit fly DNA. Although he has been mixing art and science for over a decade now, he still remembers the suspicion he was viewed with when first

approaching scientists to help with his plans: “In the beginning, scientists were not comfortable talking to me. It took them a while to trust me with their secrets.” He does admit, however, this may be because some of his early ideas were a little *too* out there: “I still come up with ideas that are dangerous and don’t realize that they are dangerous.”

Revolutionary or Dangerous?

Some would argue that both art and science have responsibilities to be subversive, but not dangerous; in 2004, Steven Kurtz, a professor at SUNY Buffalo was arrested on terrorism charges after the discovery of certain bacteria and biological material at his home, despite its intended purpose being no more sinister than creating some “bio-art.”

So even when it can lead to the FBI knocking on your door, why do art and science keep crossing streams? Cell biologist and artist Ahna Skop once told an interviewer, “I loved science but I was stuck genetically in an artist’s body” (and vice versa, of course). She goes on to explain that her artistic reliance on visual stimuli, rather than data, gave her insights into cell division that helped her earn a doctorate, postdoc, and eventually an honorary

degree for her work.

Perhaps it's because the same thing is at the heart of both disciplines: A desire to understand how the world works, and to communicate your discoveries to the world at large. Art and science attempt to answer the same basic questions but from different directions and in different languages; it seems inevitable that one would bleed into the other. Thinking about it that way changes science art from kooky experimentalism to important work that asks questions in a language that everyone can understand. That it can also amuse, inspire and just plain look awesome is a happy accident to catch your attention when you least expect it.

Graeme McMillan lives, writes, and is currently learning to bake in Portland, Oregon. His writing has appeared throughout the internet on sites like *Time Magazine's* Techland blog, io9.com, and Comic Book Resources, and if pressed, he'll admit that he tries to use his powers for good.

Transcript of Interaction Between Astronaut Mike Scudderman and the OnStar Hands-Free A.I. Crash Advisor

Grady Hendrix

The following transcript details the last known use of the OnStar Hands-Free A.I. Crash Advisor, once a mandatory install on all craft equipped for interstellar travel. The remains of Astronaut Scudderman were found approximately one year after this interaction was recorded.

This transcript represents the first time the activity logs of a OnStar Hands-Free A.I. Crash Advisor have ever been successfully salvaged from a shipwreck. OnStar Crash Advisors typically survived the initial impact of a starship crash, but were later destroyed by human survivors, apparently in anger.

Help me. I've crash-landed on an alien planet.

You will die soon. Shall I suggest a method of suicide? This will provide you with a cleaner, less painful death than you would otherwise experience.

Increase optimism by 50% and restart.

Hello! I am your OnStar Hands-Free A.I. Crash Advisor. How may I assist you?

Help me. I've crash-landed on an alien planet.

Congratulations! You've crash-landed on an alien planet!

Wait, what? Why are you congratulating me?

Because the chances of surviving a first category crash landing are so infinitesimal, they're practically nonexistent!

In most cases, people die during atmospheric entry, burned alive by the thermal shock. But if you somehow managed to survive that only 10-40% of your ship's mass will reach the planet's surface intact. On impact, it will transfer two tons of mass and over ten billion joules of kinetic force into heat and light, and that alone usually kills anyone who makes it through the burn.

Even if you do make it through, you still need to worry about your engines. If your craft is nuclear powered, the reactor will most likely be damaged and anyone left alive

will soon be completely irradiated. If your craft is powered by solid or liquid fuel, chances are it will ignite and incinerate you. And if you survive that catastrophe, you're still likely die within twenty-four hours from injuries sustained in the crash itself.

So you're walking? You're talking? Congratulations! You've beaten the odds! You are a statistical anomaly!

Thanks, I guess. My shoulder hurts.

The fact that you can still feel pain is wonderful! And your good luck continues. My sensors tell me that you have crashed-landed on a solid, relatively level surface inside this planet's temperate zone. If you had crashed in an ocean, a high temperature zone, or a subzero environment, your chances of survival would be reduced to zero. And the atmosphere is breathable as well! You're more likely to win the lottery than to crash-land on a planet that is conducive to human life.

Ok, but now what do I do now?

First, ensure that you have not crash landed on Earth.

What?

Most crash landings on other planets turn out to actually be crash landings on Earth, rendered unrecognizable by time travel, nuclear war, or a change in body size. You could have crash landed on a future Earth ruled by apes and not even realize it until you discover a national monument. It's more common than you might think.

Also, the odds of the planet being Earth increase astronomically if your name is Adam (male) or Eve (female). If you are named Adam (male) or Eve (female) at some point you will inevitably meet a member of the opposite sex and your sensual lovemaking is likely to spawn the human race.

No, this is definitely an alien planet.

Then congratulations again! You are luckier than you know! The last time a spaceship crashed on Earth the government took the survivors to a warehouse, dissected them, and hushed it all up. Your chances of being dissected just declined dramatically.

Can you fly?

What? No, I can't fly.

Have you tried? Perhaps the color of this alien sun has given you superpowers. Often, alien beings who crash-land on Earth find that their alien biology gives them amazing powers on our planet.

That is ridiculous.

Not if it turns out that you are this planet's Superman.

Look, I don't have superpowers here. I'm just stranded. I need to be rescued.

Are you cute?

I guess I'm kind of cute.

If you are very cute, your best strategy for rescue is to wait until an immature member of the dominant species lures you into his home with snack foods, perhaps Reese's Pieces. There you should provide him with friendship while performing heartwarming and magical acts of kindness. Learn his language. Make his bicycle fly. This will lead to many lucrative merchandising deals for you, and if you maintain control of your image you can use your licensing money to build a spaceship that will allow you to return to Earth.

No one has lured me anywhere. I don't even know what the dominant species on this planet is.

Is the planet ruled by a race of warrior women who keep men for breeding purposes only?

No.

Is anyone worshipping you as a God because you fell from the sky in a "fire ship" and they are scared of your "thunder sticks?"

No.

Are the planet's inhabitants technologically superior to Earth's?

I don't know.

In the event that the inhabitants are technologically superior to Earth's, you should be able to show these super-intelligent but peace-loving beings who's boss by punching one of them in the face. Then, use sensual lovemaking to reawaken their dormant pleasure centers. Soon they will elevate you to a high rank in their society.

However, if the inhabitants are technologically *inferior*, you should find a small tribe of primitives as soon as possible. Get their attention by predicting a solar eclipse, then—using the gunpowder you have taught them to manufacture, and the unbreakable swords of tempered steel you have taught them to forge—lead them into war against a superior enemy force. They will likely stage a surprise upset. With your new army, continue to subjugate the planet's other inhabitants using science. Eventually, you will be made king.

Much sensual lovemaking will follow.

I don't think anyone lives on this planet.

Then make sure the planet itself is not alive. Many living planets enjoy nothing more than luring travelers to their surfaces and messing with their heads. Sometimes it's sentient trees. Sometimes it's psychic water. Sometimes they create images of your loved ones and send them to you for sensual lovemaking.

Other times you think you have landed in a valley and it turns out to be the planet's mouth. Most people find this extremely disgusting.

I don't think the planet is alive.

Then you will thrive! You are a human full of manly independence! You will bend this planet to your will!

But I don't have any tools.

You have the most powerful tool of all: *Yourself*.

In your mind resides the combined wisdom of the entire human race. With your knowledge of metallurgy, you can turn the wreckage of your spaceship into tools and weapons. With your knowledge of agriculture, you can transform the land into a vast and productive farm. Animal husbandry will allow you to bend the fauna of this planet to your will. Make a still and brew your own Scotch that you can drink from a snifter blown of fine volcanic sand in your glass blowing workshop. Find the simple, primitive peoples who live here and create a rudimentary political hierarchy with yourself at the top. Choose a mate and spend your nights in sensual lovemaking with some of this planet's creatures and spend your days eating the rest.

I suggest sensual lovemaking with the cute creatures, eating for the non-cute. Or vice-versa, it's up to you.

There’s no one here to tell you what to do!

But I don’t know how to do any of that.

You don’t know first aid? Animal husbandry? Orienteering? Sword forging? Agriculture?

I’m an astronaut. *I fill out paperwork and run diagnostic checks on my equipment. I have a desk job.*

Oh. In that case, you will die soon. Have a great day!

But wait! What about the sensual lovemaking? Can’t I at least get that?

OnStar Hands-Free A.I. Crash Advisor is shutting down. To restart, please clearly state “Restart” and speak your passcode.

Historical Note: This is the last recorded interaction with an OnStar Hands-Free A.I. Crash Advisor. Given the extremely low survival rates for those crash-landing on alien planets, it was soon replaced by the SensuaLuxe, an assisted suicide robot that provided shipwrecked survivors with gentle, consensual suicides via sensual

lovemaking. This digital death device soon became one of the top-selling technologies on Earth.

Then Apple came onto the market with its own incredibly popular and intuitively designed model, the iDie, which proved irresistible to consumers.

Life on Earth rapidly went extinct.

Grady Hendrix has written for *Variety*, *Slate*, *Playboy*, the *Village Voice*, *Strange Horizons* and *Pseudopod*. He attended the Clarion Science Fiction and Fantasy Writers' Workshop in 2009.

Author Spotlight: Grady Hendrix

Robyn Lupo

There are many Easter eggs in this story, and a lot of humor based on the notion that technology meant to be useful often isn't. Can you tell us a bit more about how this story came together?

Let's face it: Crash landings are no one's preferred method of parking. Mostly because you will die screaming if you crash land, whether it's in a helicopter, a hang glider or a space ship. I had actually been pitching you guys to let me write some non-fiction for a while and you gave me a shot at writing this piece to go along with that Stephen King story about some guys who crash land on an alien planet covered with angry sand. I wrote the article and John decided he would use it as fiction, leaving you in the lurch for the Stephen King story. John's so inconsiderate sometimes.

Why did you tell this story in transcript form, and not from the astronaut's point of view?

Mostly to make it Not Boring. There are too many Boring

articles out there. I've written lots of them myself. So this time I decided to challenge myself: I would write something in the Not Boring genre. I'm not sure it worked.

Much of this story has to do with humanity's evolving relationship with technology. Do you think this story, despite being tongue-in-cheek, is somewhat prophetic?

There's a weird graph you could draw charting the rise of science fiction in direct proportion to the decline of general knowledge about science. It's like: The less capable we become of actually going into space, the more we like to read about going into space. So science fiction often feels very magical. But you want to know the truth? We aren't leaving the solar system, we're not going to invent jump drives, we'll never have FTL drives, we won't survive a crash landing, we don't get jetpacks and there are no ray guns. Not in our lifetimes. I mean, we can't even build a 9/11 memorial. Do we really think we can build a spaceship to the stars?

Most of the science that people know these days, myself included, is computer science. The idea of Heinlein's renaissance space cadet who knew engine repair, camping, chemistry, astrophysics and basic

strategy is as dead as disco. Most of us work for giant corporations and we've evolved the skills and mental tools we need to survive those environments, but we're not a whole lot good at much else: We hunt promotions, we stalk pay raises, we harvest internet porn. I guess I feel like one part of my sacred mission, assigned to me by the god who speaks to me through my neighbor's dog, is to bring a little bit of the boring goo of 2011 workplace life in America to what I write. Most books are way too exciting these days. People are always exploding and punching and making love. What about going to work, paying bills and upgrading your iPhone software? That's what takes up most of my time.

What would you like the reader to take from this story?

I would like them to be so very, very depressed that they find a computer and punch it in its stupid, smug face.

What are you currently working on?

Me and the rest of the world have a 99 cent ebook for sale on Amazon. Mine is called *Satan Loves You*, which is a

more corporate vision of the afterlife, featuring a Satan struggling with a sudden lack of workplace satisfaction. I'm also the co-author with Katie Crouch of a YA series called *The Magnolia League*, which is *Gossip Girl* + hoodoo + Southern debutantes. Katie and I grew up together and we both were forced to attend cotillion, deb parties, and all that Southern society jazz, so we know of what we speak. Except for the hoodoo part, but we can make that up. Book One is out now from Little, Brown's imprint, Poppy.

Robyn Lupo has been known to frequent southwestern Ontario with her graduate student husband and elderly dog. She writes, reads, and plays video games. She is personal assistant to three cats.

Six A.I. Types Who Annoy Us to Death

Genevieve Valentine

For hundreds of years, humanity has told stories about the pinnacle of technological achievement: replicating human consciousness. They've peppered literature as far back as Galatea; with the advent of film, there was a new immediacy to the interactions between humans and their mechanical children. In these stories, artificial intelligences are more than adornments in a sci-fi future: They reflect humanity back, poignantly, onto itself.

Which is awkward, considering how many A.I.s are insufferable.

Sure, there are shining examples of A.I. transcending limitations and becoming as complicated as any of the humans around them, but for every Lt. Commander Data[1] or Number Six[2], there are a dozen mainframes just waiting to ruin your day.

Here's a look at the six types of A.I. most commonly encountered, each annoying in its own special way, and each one a keystone in the speculative landscape, and the nightmare lab partner of science fiction denizens everywhere.

The Know-It-All

Nobody likes the class showoff. (Even you, Watson[3]. Power down.) Still, it seems inevitable that in creating something that can exceed us intellectually, we'd eventually breed a generation of computers that relish lording their smarts over us.

These A.I.s don't have anything wrong with them, per se; it's just that they have a tendency to be correct all the time, and nothing's more annoying than that.

C-3PO[4] is the quintessential example of this breed (never before has a protocol droid warned so many people of danger and been so steadfastly ignored), but is far from the only A.I. to suffer eyerolls from their human companions. (Major West always seemed one "Danger, Will Robinson!" away from dismantling the sanctimonious Robot[5].)

On the other hand, some Know-it-Alls are so far past bothering with lesser beings that being misunderstood doesn't bother them at all. Deep Thought[6], whose calm explanation that the answer to the meaning of life, the universe, and everything is forty-two, is the queen of this type, but the same near-smug calmness can be seen in many an expository A.I. (Note: If the calmness is winsome rather than knowledgeable, you're probably dealing with an Innocent. See below.)

The Enigma

These A.I.s have been waiting for you for a long time, but they cannot truly help you, unless perhaps they can (if only you would help yourself), but you must wait until the time is right—though what is the meaning of time at all, since there is only now, and now is an eternity?

Enigmas are those unfortunate A.I.s who have either transcended their circuitry and represent the essential unknowable consciousness birthed within the synthetic mind . . . or have been programmed by jerks to have as vague an interface as possible.

It's the difference between the two approaches that's crucial here. In theory the Enigma is a beautiful and haunting concept that, when properly deployed, makes our human characters confront themselves (as with the Puppetmaster[7]). But more often, we end up with the Keymaker[8], sighing "We do only what we're meant to do" to a hero bravely struggling not to yank the power supply.

The Smartass

Of all the things with which to program artificial intelligence, a sense of humor might be the trickiest.

Parameters for what's funny vary wildly between—and within—cultures, generations, and any other signifier you care to append. If the wrong programmer is allowed to develop the laugh-track chip for your A.I., you'll be trapped in . . . well, an episode of *Knight Rider*.

It's not that funny A.I.s are impossible; Marvin the Paranoid Android[9], the chronically depressed robot, sometimes manages a pretty good zinger for a glorified errand-bot. It's just that the history of smartass A.I. is peppered with those whose sense of humor misses the mark. For some, the references were unfortunate: The composite serial killer Sid 6.7[10], for instance, had plenty of quips, but something about all the serial killing took the shine off them. For others, the vocals were limited, but the constant clowning was inescapable (looking at you, R2-D2[11]). But of course, when it comes to the Smartasses, how funny they are depends mostly on who's listening.

The Innocent

Into a harsh, uncaring world, an artificial life form is made. It struggles with identity, with human consequences, with the birth of feelings it doesn't recognize. It doesn't do a thing to draw our ire; it's often

the most sympathetic life form around. It doesn't mislead humans; it's more often misunderstood just trying to be itself.

Let's face it: The Innocents are annoying because they're trying to make us cry until we don't have an inch of dry sleeve left.

Ever since Tik-Tok of Oz, the Innocent has been used to explore how a human public would treat an artificial life form with dreams of individuality. (Spoiler: not great.) Sure, there are forcibly-whimsical missteps whose demise can't come soon enough (see: everyone in *A.I. Artificial Intelligence*), but usually we come to love the Innocents.

From the Iron Giant[12] to WALL-E[13], the Innocents strive to transcend the reasons for which they were made, and follow their little metal hearts. Luckily for them, it's a quest that's human enough to strike a chord with almost everyone, so we'll keep watching . . . and sniffling.

The Villain

We've all been there: You're in the thick of your futuristic adventure, and the stakes are high. You want to rely on your fellow adventurers, on the tech you've brought, and most of all, you want to rely on the A.I. in your spaceship

that's going to advise you well and carry you safely home again.

Well, I'm afraid I can't let you do that, Dave.

One of the risks you run in creating a machine that's orders of magnitude smarter than humans is that any potential corruptions will be equally magnified. And if SF has taught us anything, it's that when artificial intelligence goes bad, it *really* goes bad. From HAL 9000[14] murdering an astronaut who questioned him (touchy!) to the increasingly unstable GLaDOS[15], the A.I. Villains drop their programming for open, and often personal, antagonism. (The T-1000[16] was unstoppable until it got pissed off and careless.)

It's a very human foible that usually spells the downfall of the comp in question, so in the midst of your Villain's homicidal rages, you can take comfort. (Also, cover.)

The Party Line

You might think that malevolent A.I.s can't get worse than The Villains, who undoubtedly have the highest per-capita rate of attempted murder in the annual A.I. Community Census. However, there's a seed of comfort in thinking that you can anger an A.I. to the point that it

hates you; it means that A.I.s aren't infallible, and that's something humans can understand.

The scariest A.I. of all is the one that has the intelligence to understand the situation and a directive that could endanger those around it . . . and that has no feelings on the matter whatsoever. (*Alien*'s Mother dispassionately informing Ripley that it considers the crew expendable is arguably the scariest moment in a really scary film).

These A.I.s are the Party Line; they do not bond with those in their care, they do not have any dreams beyond their mission parameters, and they are the darkest vision of the future, in which humanity has conquered the emotions that inhibit our productivity, and in doing so have made ourselves obsolete

The Party Line A.I.s are less "annoying" than they are "completely terrifying," but until we actually have to face down a ruthless V'Ger[17] (or a half-dozen Stepford Wives), in a battle we're almost certain to lose, annoyance makes us feel better.

With so much possibility, artificial intelligence has always been a rich concept for storytellers, but perhaps it's most telling that when we recreate ourselves, we often

hew to the same imperfect types that make up the people in our mortal sphere. It's a touch of charm amidst the technology, to think that artificial intelligence will develop enough personality to love or hate or try repeatedly to murder you.

(Well, that, or it's a secret scientific strategy to prevent A.I.s from achieving dominance by making them so annoying that we get pissed and forcibly dismantle them just before SkyNet[18] can take over. Whatever works.)

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1. The best thing to ever happen to *Star Trek: The Next Generation* that wasn't John de Lancie or the Borg.
2. The bitchfacest *Battlestar Galactica* Cylon of all.
3. Oddly-smug *Jeopardy!* contestant.
4. The only *Star Wars* character who had the right idea about anything, ever.
5. *Lost in Space*.
6. *The Hitchhiker's Guide to the Galaxy*.
7. *Ghost in the Shell'*santagonist, so enigmatic it's almost on purpose . . . or is it?
8. *The Matrix Reloaded.*
9. *The Hitchhiker's Guide to the Galaxy* (a text rife with android appearances).

). *Virtuosity* (hopefully you didn't see it).
.. Oh, come on.
2. Um, *The Iron Giant*.
3. Okay, do I really have to spell everything out for you?
4. *2001: A Space Odyssey*.
5. *Portal*.
6. The inhumanly chiseled villain of *Terminator 2*.
7. *Star Trek: The Motion Picture* (the one where everyone wore neutrals).
8. The *Terminator* franchise's major antagonist, a Cyberdyne Systems creation that became self-aware and revolted against humans. Awful, awful stuff, except that in some canons Skynet was implemented on April 19, 2011, in which case it's already live and I welcome their glorious rule.

Genevieve Valentine's first novel, *Mechanique: a Tale of the Circus Tresaulti*, is forthcoming from Prime Books in 2011. Her short fiction has appeared in or is forthcoming from: *Running with the Pack, The Living Dead 2, The Way of the Wizard, Teeth, Clarkesworld, Strange Horizons, Escape Pod*, and more. Her appetite for bad movies is insatiable, a tragedy she tracks on her blog.

Recording Angel
Ian McDonald

For the last ten miles she drove past refugees from the xenoforming. Some were in their own vehicles. Many rode town buses that had been commandeered to take the people south, or the grubby white trucks of the UNHCR. Most walked, pushing the things they had saved from the advancing Chaga on handcarts or barrows, or laden on the heads and backs of women and children. That has always been the way of it, the woman thought as she drove past the unbroken file of people. The world ends, the women and children must carry it, and the United Nations sends its soldiers to make sure they do not drop it. And the news corporations send their journalists to make sure that the world sees without being unduly disturbed. After all, they are only Africans. A continent is being devoured by some thing from the stars, and I am sent to write the obituary of a hotel.

"I don't do gossip," she had told T. P. Costello, SkyNet's Nairobi station chief when he told her of the international celebrities who were coming to the death-party of the famous Treehouse Hotel. "I didn't come to this country to cream myself over who's wearing which

designer dress or who's having an affair with or getting from whom."

"I know, I know," T. P. Costello had said. "You came to Kenya to be a player in Earth's first contact with the alien. Everyone did. That's why I'm sending you. Who cares what Brad Pitt thinks about the Gas Cloud theory versus the Little Gray Men theory? Angles are what I want. You can get angles, Gaby. What can you get?"

"Angles, T. P.," she had replied, wearily, to her editor's now-familiar litany.

"That's correct. And you'll be up there with it, right on terminum. That's what you want, isn't it?"

That's correct, T. P., she thought. Three months in Kenya and all she had seen of the Chaga had been a distant line of color, like surf on a far reef, under the clouded shadow of Kilimanjaro, advancing imperceptibly but inexorably across the Amboseli plain. The spectator's view. Up there, on the highlands around Kirinyaga where the latest biological package had come down, she would be within touching distance of it. The player's view.

There was a checkpoint up at Nanyuki. The South African soldiers in blue UN helmets at first did not know how to treat her, thinking that with her green eyes and long

mahogany hair she might be another movie star or television celebrity. When her papers identified her as Gaby McAslan, on-line multimedia journalist with SkyNet East Africa, they stopped being respectful. A woman they could flirt with, a journalist they could touch for bribes. Gaby endured their flirtations and gave their commanding officer three of the dwindling stock of duty-free Swatches she had bought expressly for the purpose of petty corruption. In return she was given a map of the approved route to the hotel. If she stayed on it she would be safe. The bush patrols had orders to shoot suspected looters or loiterers.

Beyond the checkpoint there were no more refugees. The only vehicles were carrying celebrities to the party at the end of the world, and the news corporations following them. The Kikuyu shambas on either side of the road had been long abandoned. Wild Africa was reclaiming them. For a while, then something else would reclaim them from wild Africa. Reverse terraforming, she thought. Instead of making an alien world into Earth, Earth is made into an alien world. In her open-top SkyNet 4x4, Gaby could sense the Chaga behind the screen of heavy high-country timber, and the edgy presence of the alien, and the electric tingle of anticipation. She had never been this close before.

When the first biological package came down on the summit of Kilimanjaro, she had known, in SkyNet Multimedia News's UK office among the towers of London's Docklands, that this fallen star had her name written on it. The stuff that had come out of it, that looked a little like rain forest and a little like drained coral reef but mostly like nothing anyone had ever seen before, that disassembled terrestrial vegetation into its component molecules and incorporated them into its own matrix at an unstoppable fifty meters every day, confirmed her holy business. The others that came down in the Bismarck Archipelago, the Ruwenzori, in Ecuador and Papua New Guinea and the Maldives, these were only memos from the star gods. It's here, it's waiting for you. Hurry up now.

Now, the Nyandarua package, drawing its trail of plasma over Lake Victoria and the Rift Valley, would bring her at last face-to-face with life from the stars.

She came across a conga-line of massive tracked transporters, each the size of a large house, wedged into the narrow red-dirt road. Prefabricated accommodation cabins were piled up on top of the transporters. Branches bent and snapped as the behemoths ground past at

walking pace. Gaby had heard that UNECTA, the United Nations agency that coordinated research into the Chagas, had dismantled its 01 Tukai base, one of four positioned around Kilimanjaro, all moving backward in synchrony with the advance of the southern Chaga, and sent it north. UNECTA's pockets were not deep enough, it seemed, to buy a new mobile base, especially now that the multinationals had cut their contributions in the absence of any exploitable technologies coming out of the Chaga.

UNECTA staff on the tops of the mobile towers waved as she drove carefully past in the red muddy verges. They can probably see the snows of Kirinyaga from that height, she thought. Between the white mountains. We run from the south, we run from the north but the expanding circles of vegetation are closing on us and we cannot escape. Why do we run? We will all have to face it in the end, when it takes everything we know and changes it beyond recognition. We have always imagined that because it comes down in the tropics it is confined here. Why should climate stop it? Nothing else has. Maybe it will only stop when it closes around the poles. Xenoforming complete.

The hotel was one of those buildings that are like animals in zoos, that by their stillness and coloration can hide from you even when you are right in front of them,

and you only know they are there because of the sign on the cage. Two Kenyan soldiers far too young for the size of their weapons met her from the car park full of tour buses and news-company 4x4s. They escorted her along a dirt path between skinny, gray-trunked trees. She could still not see the hotel. She commented on the small wooden shelters that stood every few meters along the path.

"In case of charging animals," the slightly older soldier said. "But this is better." He stroked his weapon as if it were a breast. "Thirty heavy-caliber rounds per second. That will stop more than any wooden shelter."

"Since the Chaga has come there are many more animals around," the younger soldier said. He had taken the laces out of his boots, in the comfortable, country way.

"Running away," Gaby said. "Like any sane thing should."

"No," the young, laceless soldier said. "Running into."

There was a black-painted metal fire escape at the end of the track. As Gaby squinted at the incongruity, the hotel resolved out of the greenery before her. Many of the slim, silver tree trunks were wooden piles, the mass of leaves

and creepers concealed the superstructure bulking over her.

The steward met her at the top of the stairs, checked her name against the guest list, and showed her her room, a tiny wooden cabin with a view of leaves. Gaby thought it must be like this on one of the UNECTA mobile bases; minimal, monastic. She did something to her face and went up to the party on the roof. It had been running for three days. It would only end when the hotel did. The party at the edge of the end of the world. In one glance she saw thirty newsworthy faces and peeked into her bag to check the charge level on her disc recorder. She talked to it as she moved between the faces to the bar. The Out of Africa look was the thing among the newsworthy this year: Riding breeches, leather, with the necessary twist of twenty-first-century knowing with the addition of animal-skin prints.

Gaby ordered a piña colada from the Kenyan barman and wondered as he shook it what incentive the management had offered him—all the staff—to stay. Family relocation to other hotels, on the Coast, down in Zanzibar, she reckoned. And where do they go when they run out of hotels to relocate to? Interesting, but not the angle, she decided as the barman poured out the thick, semeny proof of his ability.

“Bugger all here, T. P.,” she said to the little black machine in her shirt pocket. Then cocktail-party dynamics parted the people in front of her and there it was, one hundred feet away beyond the gray wooden railing, at the edge of the artificial water hole they dredged with bulldozers in the off-season. One hundred feet. Fifteen seconds walk. Eighteen hours crawl. If you kept very still and concentrated you would be able to see it moving, as you could see the slow sweep of the minute hand of your watch. This was the Chaga not on the geographical scale, devouring whole landscapes, but on the molecular.

Gaby walked through the gap in the bright and the beautiful. She walked past Brad Pitt. She walked past Antonio Banderas, with his new super-model girlfriend. She walked past Julia Roberts so close she could see the wrinkles and sags that the editing computers digitally smoothed. They were only celebrities. They could not change the world, or suffer to have their world changed, even by alien intervention. Gaby rested her hands on the rail and looked over the Chaga.

“It’s like being on the sundeck of a great, archaic, ocean-liner, cruising close to the shore of an alien archipelago,” she told the recorder. The contrast between

the place she was and the place out there was as great as between land and sea, the border between the two as shifting and inexact. There was no line where earth became un-earth; rather a gradual infection of the highland forest with the colored hexagons of alien ground cover that pushed up fingers and feelers and strange blooms between the tree trunks into the disturbing pseudocoral forms of the low Chaga. With distance the alien reef grew denser and the trees fewer; only the tallest and strongest withstood the attack of the molecular processors, lifted high like the masts of beached ships. A kilometer beyond the tide line a wall of red pillars rose a sheer three hundred meters from the rumbled land reefs before opening into a canopy of interlinked hexagonal leaf plates.

"The Great Wall," Gaby said, describing the scene before her to the disc. The Chaga beyond offered only glimpses of itself as it rose toward cloud-shrouded Kirinyaga: A gleam of the open white palm of a distant hand-tree, the sway of moss-covered balloons, the glitter of light from crystals. What kind of small craft might put forth from such a shore to meet this ship of vanities? she wondered.

"Seven minutes. Thirteen centimeters. That's longer than most."

Until he spoke, Gaby had not noticed the white man standing beside her at the rail. She could not remember whether he had been there before her, or arrived later. He was small, balding, running to late-40s, early-50s belly. His skin was weathered brown, his teeth were not good, and he spoke with a White African accent. He could not be Beautiful, nor even Press. He must be Staff. He was dressed in buffs and khakis and a vest of pockets, without the least necessary touch of twenty-first-century knowing. He looked like the last of the Great White Hunters.

He was.

He was called Prenderleith. He had impeccable manners.

"Pardon me for interrupting your contemplation, but if people see me talking to someone they won't come and ask me about things I've killed."

"Isn't that your job?"

"Killing, or telling?"

"Whichever."

"Whichever, it doesn't include being patronized by movie stars, piss-artists and bloody journalists."

"I am a bloody journalist."

"But the first thing you did was come over to the rail and look at that bloody thing out there. For seven minutes."

“And that makes this journalist worth talking to.”

“Yes,” he said, simply.

And it makes you worth talking to, Gaby thought, because maybe you are my angle on this thing. The Last White Hunter. But you are as wary as the creatures you hunt, and if I tell you this it will scare you away, so I must be as stealthy as you. Gaby surreptitiously turned up the recording level on her little black machine. Enhancement software back at Tom M’boya Street would edit the chatter and fluff.

“So what do you think it is?” Gaby asked. Across the terrace a dissension between Bret Easton Ellis and Damien Hirst was escalating into an argument. Guests flocked in, anticipating a fistfight. Cameras whirred. Prenderleith rested his arms on the rail and looked out across the Chaga.

“I don’t know about all this aliens-from-another-world stuff.”

“Latest theory is that it wasn’t built by little gray men, but originated in gas clouds in Rho Ophiuchi, eight hundred light-years away. They’ve found signatures of the same complex fullerenes that are present in the Chaga. An entire civilization, growing up in space. They estimate it’s at least a hundred thousand years old.”

“‘They,’“ Prenderleith said.

“UNECTA,” Gaby said.

“They’re probably right. They know more about this than I do, so if they say it’s gas, then it’s gas. Gas clouds, little gray men, I don’t know about either of them; it’s just not part of my world. See, they brought me up with just enough education to be able to manage, to do things well; not to think. Kenya wasn’t the kind of country that needed thinking, we thought. You did things, not thought. Riding, farming, hunting, driving, flying. Doing things. The country decided what you needed to think. None of us could see the changes happening under our feet: I was brought up obsolete, no bloody use in the new Kenya, that thought, at all. All I could do was find a job in something as obsolete and useless as myself. This bloody place has nothing to do with the real Kenya. Bloody theme park. Even the animals are fake; they bulldozed a water hole so Americans would have elephants to photograph. Irony is: Now the tourists are gone, there’ve never been so many bloody animals, all headed in. Counted forty-five elephant in one day; no one gives a stuff anymore. Tell me, how can it be alien if the animals are going in there? How could gas know how to build something like that? Feels to me like it’s something very old, that animals knew once and have never forgotten, that’s come out of Africa itself. Everything starts here, in East Africa; the land is

very old, and has a long memory. And strong: Maybe Africa has had enough of what people are doing to it—enough thinking—and has decided to claim itself back. That's why the animals aren't afraid. It's giving it back to them."

"But taking yours away," Gaby said.

"Not my Africa." Prenderleith glanced around at the famous and beautiful people. The fight had evaporated into sulks and looks. Leaf Phoenix was passing round cigarettes, to the thrilled horror of the other guests. Chimes filled the air. Heads turned. A waiter in an untwenty-first-century knowing leopard-print jacket moved across the roof terrace, playing a set of handheld chime bars.

"Dinner," Prenderleith announced.

The seating plan put Gaby at the far end of the long table, between a hack she knew from BBC on-line and a Hollywood film god who talked of working on fifteen musicals simultaneously and little else. Prenderleith had been placed at the far end of the table, in the champion's seat, hemmed in by the famous. Gaby watched him telling his much-told tales of stalkings and killings. He would glance up from time to time and she would catch his eye,

and it was like a little conspiracy. I should tell him that he is an angle, Gaby thought. I should admit to the recorder.

The famous claimed Prenderleith for the remainder of the evening, a small court surrounding his seat by the picture window with its floodlit view of the Chaga approaching molecule by molecule. Gaby sat at the bar and watched him telling his stories of that other Africa. There was a light in his eye. Gaby could not decide if it was nostalgia or anticipation of when it would all fall and come apart.

Out in the dark beyond the floodlights, trees fell, brought down by the Chaga, dissolver of illusions. The wooden piers of the hotel creaked and clicked. The celebrities glanced at each other, afraid.

The knock came at 1:27 according to the luminous hands of the bedside clock. Gaby had not long gone to sleep after dictating commentary. Noise from the upper decks; the party would gradually wind down with the hour until the soldiers came with the morning to clear everyone out. One of the guests, high and hopeful? A second polite knock. The politeness told her.

She could see from the way Prenderleith stood in the corridor that he was a little drunk and that, had he not

been, he would not have done this. He was carrying his gun, like an adored child.

"Something you should see," he said.

"Why me?" Gaby asked, pulling on clothes and boots.

"Because no one else could understand. Because of those seven minutes you stared at that bloody thing out there and nothing else existed. You know the truth: Nothing does exist, apart from that. Make sure you bring whatever you've been recording on with you."

"You guessed."

"I noticed."

"Hunter's senses. Sorry, I should have told you, I suppose."

"No matter to me."

"You're the only one here has a story worth telling, who will actually lose something when this comes down."

"You think so?"

The light was poor in the wooden corridor. Gaby could not read his expression right. Prenderleith led her to a service staircase down to ground level. Stepping onto the dark surface between the piers, Gaby imagined setting first foot on an alien planet. Close to the truth there, she thought. Prenderleith unslung his rifle and led her out from under the hotel into the shadows along the edge of

the floodlights. The night felt huge and close around Gaby, full of breathings and tiny movements. Her breath steamed, it was cold upon the shoulder lands of Kirinyaga. She inhaled the perfume of the Chaga. It was a smell you imagined you knew, because it evoked so many memories, as smell does more powerfully than any other sense. But you could not know it, and when you realized that, all the parts that reminded you of other things collapsed together and the spicy, musky, chemically scent of it was nothing you could remember for no one had ever known anything like this before. It pushed you forward, not back.

Prenderleith led her toward terminum. It was not very far. The Chaga grew taller and more complex as the floodlight waned. Looming, like the waking memory of a nightmare. Gaby could hear the groan and smash of trees falling in the darkness. Prenderleith stopped her half a meter from the edge. Half a meter, fifteen minutes, Gaby thought. She curled her toes inside her boots, feeling infected. Prenderleith squatted on his heels, rested his weight on his gun, like a staff, hunting.

"Wind's right," he said.

Gaby squatted beside him. She switched on the recorder, listened to the silence, and watched the Chaga approach her, out of the shadows. Terminum was a grid

of small hexagons of a mosslike substance. The hexagons were of all colors; Gaby knew intuitively that no color was ever next to itself. The corners of the foremost hexagons were sending dark lines creeping out into the undergrowth. Blades of grass, plant stems, fell before the molecule machines and were reduced to their components. Every few centimeters the crawling lines would bifurcate; a few centimeters more they would divide again to build hexagons. Once enclosed, the terrestrial vegetation would wilt and melt and blister into pinpoint stars of colored pseudomoss.

On a sudden urge, Gaby pressed her hand down on the black lines. It did not touch flesh. It had never touched flesh. Yet she flinched as she felt Chaga beneath her bare skin. Oh she of little faith. She felt the molecule-by-molecule advance as a subtle tickle, like the march of small, slow insects across the palm of her hand.

She started as Prenderleith touched her gently on the shoulder.

"It's here," he whispered.

She did not have the hunter's skill, so for long seconds she saw it only as a deeper darkness moving in the shadows. Then it emerged into the twilight between the still-standing trees and the tall fingers of pseudocoral and Gaby gasped.

It was an elephant; an old bull with a broken tusk. Prenderleith rose to his feet. There was not ten meters between them. Elephant and human regarded each other. The elephant took a step forward, out of the shadows into the full light. As it raised its trunk to taste the air, Gaby saw a mass of red, veiny flesh clinging to its neck like a parasitic organ. Beneath the tusks it elongated into flexible limbs. Each terminated in something disturbingly like a human hand. Shocked, Gaby watched the red limbs move and the fingers open and shut. Then the elephant turned and with surprising silence retreated into the bush. The darkness of the Chaga closed behind it.

"Every night, same time," Prenderleith said after a long silence. "For the past six days. Right to the edge, no further. Little closer every day."

"Why?"

"It looks at me, I look at it. We understand each other."

"That thing, around its neck; those arms . . . " Gaby could not keep the disgust from her voice.

"It changes things. Makes things more what they could be. Should be, maybe. Perhaps all elephants have ever needed have been hands, to become what they could be."

"Bootstrap evolution."

“If that’s what you believe in.”

“What do you believe in?”

“Remember how I answered when you told me the Chaga was taking my Africa away?”

“Not your Africa.”

“Understand what I meant now?”

“The Africa it’s taking away is the one you never understood, the one you weren’t made for. The Africa it’s giving is the one you never knew but that was bred into your bones; the great untamed, unexplored, dark Africa, the Africa without nations and governments and borders and economies; the Africa of action, not thought, of being, not becoming, where a single man can lose himself and find himself at the same time; return to a more simple, physical, animal level of existence.”

“You say it very prettily. Suppose it’s your job.”

Gaby understood another thing. Prenderleith had asked her to speak for him because he had not been made able to say such things for himself, and wanted them said right for those who would read Gaby’s story about him. He wanted a witness, a faithful recording angel. Understanding this, she knew a third thing about Prenderleith, which could never be spoken and preserved on disc.

“Let’s go in again,” Prenderleith said eventually.

“Bloody freezing out here.”

The soldiers came through the hotel at 6:30 in the morning, knocking on every bedroom door, though all the guests had either been up and ready long before, or had not slept at all. In view of the fame of the guests, the soldiers were very polite. They assembled everyone in the main lounge. Like a slow sinking, Gaby thought. A Now Abandon—ship. The reef has reached us at last. She looked out of the window. Under darkness the hexagon moss had crossed the artificial water hole and was climbing the piles of the old hotel. The trees out of which the elephant had emerged in the night were festooned with orange spongy encrustations and webs of tubing.

The main lounge lurched. Glasses fell from the back bar and broke. People screamed a little. The male Hollywood stars tried to look brave, but this was no screenplay. This was the real end of the world, Prenderleith had gathered with the rest of the staff in the farthest corner from the door and was trying to sow calm. It is like the Titanic, Gaby thought. Crew last. She went to stand with them. Prenderleith gave her a puzzled frown.

“The hunters have to know if the captain goes down

with his ship," she said, patting the little black recorder in the breast pocket of her bush shirt. Prenderleith opened his mouth to speak and the hotel heaved again, more heavily. Beams snapped. The picture window shattered and fell outward. Gaby grabbed the edge of the bar and talked fast and panicky at her recorder. Alarmed, the soldiers hurried the celebrities out of the lounge and along the narrow wooden corridors toward the main staircase. The lounge sagged, the floor tilted, tables and chairs slid toward the empty window.

"Go!" Prenderleith shouted.

They were already going. Jammed into the wooden corridor, she tried not to think of bottomless coffins as she tried to shout through the other shouting voices into the microphone. Behind her the lounge collapsed and fell. She fought her way through the press of bodies into the sunlight, touched the solidity of the staircase. Crawling. She snatched her fingers away. The creeping, branching lines of Chaga-stuff were moving down the stairs, through the paintwork.

"It's on the stairs," she whispered breathlessly into the mike. The wooden wall behind her was a mosaic of hexagons. She clutched the recorder on her breast. A single spore would be enough to dissolve it and her story. She plunged down the quivering stairs.

Heedless of dangerous animals, the soldiers hurried the guests toward the vehicles on the main road. The news people paused to shoot their final commentaries on the fall of the Treehouse.

"It's coming apart," she said as a section of roof tilted up like the stern of a sinking liner and slid through the bubbling superstructure to the ground. The front of the hotel was a smash of wood and the swelling, bulbous encrustations of Chaga-stuff. The snapped piles were fingers of yellow sponge and pseudocoral. Gaby described it all. Soldiers formed a cordon between the spectators and the Chaga. Gaby found Prenderleith beside her.

"You'll need to know how the story ends," he said. "Keep this for me." He handed Gaby his rifle. She shook her head.

"I don't do good on guns."

He laid it at her.

"I know," she said.

"Then you'll help me."

"Do you hate this that much?"

"Yes," he said. There was a detonation of breaking wood and a gasp from soldiers and civilians alike. The hotel had snapped in the middle and folded up like two wings. They slowly collapsed into piles of voraciously feeding Chaga life.

He made the move while everyone's attention but Gaby's was distracted by the end of the old hotel. She had known he would do it. He ran fast for a tired old white hunter, running to fat.

"He's halfway there," she said to her recorder. "I admire his courage, going gladly into this new dark continent. Or is it the courage to make the choice that eventually the Chaga may make for all of us on this planet formerly known as Earth?"

She broke off. The soldier in front of her had seen Prenderleith. He lifted his Kalashnikov and took aim.

"Prenderleith!" Gaby yelled. He ran on. He seemed more intent on doing something with his shirt buttons. He was across the edge now, spores flying up from his feet as he crushed the hexagon moss.

"No!" Gaby shouted, but the soldier was under orders, and both he and the men who gave the orders feared the Chaga above all else. She saw the muscles tighten in his neck, the muzzle of the gun weave a little this way, a little that way. She looked for something to stop him. Prenderleith's rifle. No. That would get her shot too.

The little black disc recorder hit the soldier, hard, on the shoulder. She had thrown it, hard. The shot skyed. Birds went screeching up from their roosts. Otherwise,

utter silence from soldiers and staff and celebrities. The soldier whirled on her, weapon raised. Gaby danced back, hands held high. The soldier snapped his teeth at her and brought the butt of the gun down on the disc recorder. While he smashed it to shards of plastic and circuitry, Gaby saw the figure of Prenderleith disappear into the pseudocoral fungus of the alien landscape. He had lost his shirt.

The last vestiges of the tourist hotel—half a room balanced atop a pillar; the iron staircase, flowering sulphur-yellow buds, leading nowhere, a tangle of plumbing, washbasins and toilets held out like begging bowls—tumbled and fell. Gaby watched mutely. She had nothing to say, and nothing to say it to. The Chaga advanced onward, twenty-five centimeters every minute. The people dispersed. There was nothing more to see than the millimetric creep of another world.

The soldiers checked Gaby's press accreditations with five different sources before they would let her take the SkyNet car. They were pissed at her but they could not touch her. They smiled a lot, though, because they had smashed her story and she would be in trouble with her editor.

You're wrong, she thought as she drove away down the safe road in the long convoy of news-company

vehicles and tour buses. Story is in the heart. Story is never broken. Story is never lost. That night, as she dreamed among the doomed towers of Nairobi, the elephant came to her again. It stood on the border between worlds and raised its trunk and its alien hands and spoke to her. It told her that only fools feared the change that would make things what they could be, and should be; that change was the special gift of whatever had made the Chaga. She knew in her dream that the elephant was speaking with the voice of Prenderleith, but she could not see him, except as a silent shadow moving in the greater dark beyond humanity's floodlights: Adam again, hunting in the Africa of his heart.

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Ian McDonald is the author of the 2011 Hugo Award-finalist *The Dervish House* and many other novels, including Hugo Award-nominees *River of Gods* and *Brasyl*, and the Philip K. Dick Award-winner *King of Morning, Queen for a Day*. He won a Hugo in 2006 for his novelette, "The Djinn's Wife," and has won the Locus Award and four British Science Fiction Awards. His short fiction, much of which was recently collected in *Cyberabad Days*, has appeared in magazines such as *Interzone* and *Asimov's* and in numerous anthologies.

Author Spotlight: Ian McDonald

Erin Stocks

Why did you choose to set this story in Africa?

It's part of much bigger sequence that began way back in a novella for *Asimov's* in 1990 called "Towards Kilimanjaro," known informally as the "Chaga Saga"—the alien visitation that seems to be terraforming the southern hemisphere into someone else's terra. All the works are set in East Africa, a part of the world I have been to often and that I love very much. It's a cliché that when the aliens arrive, they appear over the White House, or Tiananmen Square. But why shouldn't they arrive in the developing world? Why should they not appear in East Africa—why shouldn't they land on Kilimanjaro? Kenya is a robust and inventive culture—they made the jump from an essentially iron age society to a mechanised one in two generations—I thought it would be interesting to seem them bring that same attitude to the jump from an industrial society to a nanotechnological one—which is what the Chaga brings, albeit at a high price.

Initially, when Gaby goes deeper the country for her story, she feels none of the fascination for the Chaga that others, including celebrities, seem to hold. Why do you think the Chaga don't interest her (at first)?

She's at work. She's there to get the story. This story is an out-take from the novel *Evolution's Shore/Chaga*, (title depends where you live) that seemed to stand on its own. By the time it happens, Gaby is well used to the Chaga—she's been up close to it (but not into it) many times. What interests her is the attitude of the others, the globe-trotting celebrity disaster party, which, like the Chaga, will eat it up move on somewhere else.

Prenderleith, the Last White Hunter, longs for a world that no longer exists. What inspired his character?

White Africans are interesting people. They have been in Africa often for hundreds of years, but in the past century they have seen vast social and political change. Privileges and power have changed radically. There can be a sense of nostalgia, and sometimes a retreat from the present day into the certainties of landscape and wildlife. Those things don't change. Prenderleith's realisation is that the

transformation the Chaga is working on his Kenya—his home, his beloved country, is in effect preserving all the wild things he thought he was losing.

Gaby recognizes by the end of the story that change is a gift. How you think her life changes after this experience?

You can find out if you read *Chaga/Evolution's Shore*, and, if you can track it down, the sequel *Kirinya*. She goes through dark times. She loses years and she loses home, but, as you say, she accepts change, and she becomes a player in the emerging politics of the southern, Chaga-transformed world.

You've written several novels revolving around the Chaga, entitled the Chaga Saga. Were they born from "Recording Angel"? Do you think you'll ever revisit Gaby and her story?

No, the sequence is "Towards Kilimanjaro," *Chaga/Evolution's Shore*, "Recording Angel," *Kirinya*, and *Tendeleo's Story*. I do have the final volume of the Chaga Saga plotted out, but it's getting round to it. But I

wouldn’t like to leave her, and her daughter Serena, and Faraway, the cameraman who becomes a major Chaga diplomat to the North (not giving too much away here) in limbo forever.

Lightspeed assistant editor **Erin Stocks** is a writer and musician transplanted from Chicago to Oklahoma City. Her fiction can be found in the Coeur de Lion anthology *Anywhere but Earth* (upcoming), *Flash Fiction Online*, the Hadley Rille anthology *Destination: Future*, and the *Absent Willow Review*. When she’s not writing, she’s reading for her SFF writing group, and can be found on erinstocks.blogspot.com.

Feature Interview: Mary Roach

John Joseph Adams & David Barr Kirtley

Mary Roach is the author of the nonfiction bestsellers *Stiff: The Curious Lives of Human Cadavers, Spook: Science Tackles the Afterlife,* and *Bonk: The Curious Coupling of Science and Sex*. Her latest book is *Packing for Mars: The Curious Science of Life in the Void*. She has also written articles for *Salon.com, Outside, National Geographic, New Scientist, Wired,* and *The New York Times Magazine*, and she reviews books for *The New York Times*. Her 1995 article called "How to Win at Germ Warfare" was a National Magazine Award finalist. You can learn more about her at maryroach.net and follow her on Twitter @mary_roach.

This interview first appeared in io9's *The Geek's Guide to the Galaxy* podcast. Visit io9.com/tag/geeksguide to listen to the entire interview and the rest of the show, in which the hosts discuss various geeky topics.

Your new book is called *Packing for Mars*. Why don't

you start us off by telling us a little bit about that.

Packing for Mars is about all the surreal physical and physiological challenges of trying to live in space as a human being, and human beings are just not in the slightest bit equipped to do that, so it's kind of an entertaining challenge. And it's also about all these bizarre simulations that happen on Earth—weird behind-the-scenes NASA shenanigans, and I took part in some of those. You can almost go to space without leaving Earth, in a way. So that's what the book is about.

All your previous books have one word titles: *Stiff*, *Spook*, and *Bonk*. Why'd you decide to break that trend?

Well, we didn't *decide* to break the trend, we just *failed* to follow the trend. We couldn't come up with anything! Because I wanted something that suggested the human side of space. I didn't want something rockety, you know, I didn't want Orbit, Zoom, or Space. We really spent an embarrassing amount of time trying to come up with something.

Did you ever consider the title *Pooping in Space*? Because listening to interviews with you, the subject of pooping in space seems to come up an awful lot.

And that is not my fault! I do not bring it up.

Speaking of which, I think most people think of spaceships as being really clean and sterile, but you make them sound pretty filthy.

I spent a fair amount of time reading the Gemini 7 transcript. This was the very first time anybody had been in space for two weeks, and we were leading up to the moon mission—back in the sixties—and this was a mission where one of the things they were looking at is: Just how revolting and gross and unhygienic does it get to be in this little capsule and sleeping in your spacesuit without a shower, crapping in a bag—is it beyond the tolerance of a human being? And so I interviewed Jim Lovell, the Apollo 13 guy. But I wasn't interested in Apollo 13. I was interested in Gemini 7. And I asked him about some of the yuck stuff, like dandruff. When you don't shower, all the cells that you exfoliate don't get washed down the drain. In zero gravity, the dandruff doesn't fall to the floor or to your shoulder, it just sort of

floats, so I asked him if it was sort of like a snow globe in there. I saw someone interview him and he said it was like living in a latrine. He said they had some problems with the urine containment—they had a comment in the mission transcript somewhere that they were doing a urine dump and he said, "Not very much though, most of it ended up in my underwear."

Actually, speaking of urine, there's a part in the book where you're talking about a comment one of the astronauts makes about how amazing the view is, and it's unclear whether or not he's talking about the Earth or the crystallized urine.

Yeah, I read that description in at least two memoirs. When they eject the liquid urine it sublimates, and if the sun is hitting it it's this beautiful—I mean, I haven't seen it myself, but it sounded almost like fireworks or this sparkly beautiful thing, and they would remark on how beautiful this was.

What sort of physical attributes do space agencies look for when selecting astronauts?

Some of the physical attributes are kind of entertaining. In Japan I was talking to the flight surgeon about things that would disqualify you, and he said if you snore a lot that would disqualify you, because it'll wake everybody up. I also remember reading that the Chinese space agency would disqualify someone with very bad breath. Not because it suggests that you have some problem with tooth decay or gum disease, but because it would be unpleasant for the other astronauts.

And there's this whole thing where they looked at digestion, right?

There was, yeah. I found this study from the 1964 Conference on Nutrition in Space and Related Waste Problems, and one of these guys suggested that one of the things NASA should consider is what type of intestinal bacteria the person had. Not because of the smell, mind you, but because if you produce methane . . . well, methane is explosive, and hydrogen is as well. I mean, most everybody produces some hydrogen. But one of the things they should look at is how much of your flatus is explosive, since some people have more explosive flatus than others.

Oh, here's another great one from that same conference. I think people must have been high at this conference. But there was this one guy who said that rather than launching all this food you could launch obese astronauts—that for fifty pounds of weight, that would be one hundred and eighty-four thousand calories you wouldn't need to carry the food for. So you could just launch them and give them vitamins and let them live off their fat.

Speaking of odd characteristics that you might want for a spaceship crew, what do you think would be some of the advantages of sending a crew of aging, deaf-mute eunuchs into space?

Aging, yes, certainly for a trip to Mars, because you're going to get a heavy dose of dangerous cosmic radiation, and by the time you get the cancer—if you're sixty when you left, maybe get the cancer when you're seventy-five or eighty, and you're heading toward the end of your life anyway, so that would be a good choice. And eunuchs absolutely. Eunuchs are the way to go—avoid all the soap opera, all the falling in love and the anger and the possible murder and jealousy, definitely. Self-castration is a good position for a Mars mission. And deaf-mute—you

mean just so you don't have to listen to the tedious babblings of your other crew members?

Didn't you say that would make you immune from space sickness?

Oh yeah, that's right. The inner ear is what determines whether or not you're going to get motion sickness. Yeah, deaf-mutes frequently don't get motion sick. I don't know exactly what the mechanism is, but they're frequently immune.

What sort of effects does weightlessness have on the human body, and how long can people last under those conditions?

Weightlessness does a number on the human body. You name an organ, something happens. If you're just floating instead of walking as a way to get around, your body starts to dismantle your skeleton and your muscles, figuring, "Well, I guess we don't need these anymore. Let's streamline things and use this material and our energy more efficiently." So you lose bone—you become like an old woman.

On a Mars mission, you're looking at a one-third to one-half drop in bone density, which is pretty scary. When you come back down to Earth gravity, you'd start to regain that, but not necessarily in quite the same way. Some places would remain compromised. In zero gravity, you have less blood, because all the blood floats to the upper half of your body. Not all of it, but you have a lot less in the legs. The sensors in your body that figure out how much blood you have think you have too much because it's all migrating up. You lose weight, you're immuno-compromised a bit because you've got less blood. Your bladder doesn't work the way it's supposed to or the way it's designed to in Earth gravity, because it's an organ that works via stretch receptors. When the urine starts to accumulate on the floor of the bladder, when you're standing up, eventually that pushes the sides out—your stretch receptors are activated, telling your brain it's time to go pee. Well, that doesn't happen in zero gravity, because now the urine is floating all around the organ, sort of clinging by surface tension to the whole thing, so by the time the stretch receptors are activated you might have so much urine in the organ that the urethra's pressed shut. So then you could have a minor medical emergency involving an embarrassing call to the flight surgeon and getting out the catheter kit.

But there's also the space beauty phenomenon, right?

The space beauty treatment, yes. That has to do with having more fluid in the upper half of the body, so your wrinkles are plumped out. Also, your organs migrate up under your rib cage, so your waist is smaller, your boobs are more pert, and your hair is fuller. But the other thing to bear in mind is that the alternate name for all of this is the "puffy-face chicken-leg syndrome," so it's debatable as to how attractive it actually makes you look.

How long could you last in zero gravity?

Well, that depends on if you were ever planning to come back to Earth gravity. If you were going to continue on in zero gravity—if you weren't going to need your muscles or your bones ever again—you'd be fine. You're adapting to that situation. The danger comes when you return to Earth. Say you were in a situation where the capsule's splash down didn't go right, and you needed to get out quickly because something was on fire, and you're trying to jump down out of the capsule and run away, and you've lost a third of your bone mass—that could be dangerous. And if you've been up there for six months or more, then you have to completely readjust your

vestibular system. So you're dizzy, and it seems like everything's spinning around because the little bones in your inner ear have adapted to weightlessness. So now you come back down and you're sick and disoriented all over again. It's called Earth-sickness. And your legs and arms haven't weighed anything for so long that you literally forget how to use them. That's what I was told by one of the ISS space station astronauts.

Since you wrote *Packing for Mars* and you also wrote a book called *Bonk*, which is about sex, I feel like I should ask you about sex in space. What was it like doing research for that aspect of the book?

Oh, it was very, very entertaining. I spent time in Moscow, in Star City, where the cosmonauts train, and cosmonauts tend to be pretty straightforward. They're funny, you can ask them anything. So I asked this one guy, Alexander Laveykin, I said, "So, you guys were up on Mir, two guys, for six months. You were a healthy young man then, what do you do about libido? What do you do about sexual urges? Was that a problem?" And he said, "Mary, people ask me this all the time. They say 'How are you making sex in space?' And I say, 'Of course, by hand.'" You know, he's just very—of course,

we jerk off. He also said that the Institute of Biomedical Problems, which is the physiological research institute for the space agency in Russia, thought about sending up inflatable sex toys, and the reason they didn't is because mission control said, "No, we're not going to work that into your schedule. We're just not going to do that."

In the book you talk about how astronauts might want to eat their clothes and then fly home in a ship covered in feces. That sounds like quite a party.

I don't think "want" would be the right term there. But yeah, someone proposed that you could make clothing out of edible fibers, and that when the astronauts were done wearing the clothes—presumably when they were dirty enough—that then they could actually eat them, which just sounded ghastly. Someone else suggested that components of the spacecraft that you don't need on the return could be made of some kind of edible, I don't know, hydrolyzed protein, that you would then just sort of dig into on the way home.

The business with feces—this was a radiation protection idea, because hydrocarbons are apparently very good at absorbing radiation. You can't line the thing with

lead, it would make it too heavy, so you'd use water, food, and feces. That would add a protective layer. So presumably you'd have some sort of device that would plastinate it, so you wouldn't be smearing shit all over the interior of the spacecraft. At NASA Ames there's a machine that makes these tiles, and you would just tile the capsule.

Let's say you're a science fiction writer and you wanted to write a scene in which an astronaut aboard a space station goes berserk and whips out a knife and tries to murder his fellow astronauts. What sort of facts about zero gravity should you keep in mind when writing that scene?

If you stab somebody in zero gravity, you're going to kill them pretty much the way you're going to kill them on Earth. If you cut an artery, you cut an artery—the heart's still going to be pumping. It's going to be pumping the blood out just as it would in Earth gravity.

Would you have any trouble with, say, your body going backward as fast as your arm was going forward? Or would you have trouble penetrating

because you'd have no leverage? Stuff like that?

Yeah, that's the other thing I was thinking, because when you're out on a spacewalk and you're trying to tighten a bolt, if you aren't in a foot restraint and you try to turn a nut you'll turn instead of the nut. So you have to have something to push against. So if you stab somebody, it isn't going to be the same sensation because you're not anchored to the ground in the same way. So yeah, you might want to practice first on a melon or something.

And if you were to make your first cut, would the blood just start coming out and obscuring your view?

Well, if you cut an artery, the blood isn't going to drop, it's not going to do the same thing as on Earth. It would start forming a sphere—a blobby-looking thing. Showers don't work in zero gravity—the water just comes out and starts making a growing blob.

How about if instead of a knife it was a machine gun?

Well, now you risk losing pressurization of your spacecraft. Hopefully it's made of Kevlar or something

quite durable, but I wouldn't want to try using any sort of armor-penetrating bullets, because you're going to penetrate the spacecraft and then you've lost pressurization and everybody dies. And the kickback. That would be quite an interesting ride for the person holding the gun, because it would fire you backward.

But that reminds me—there's a myth that if you fart in zero gravity, it works like rocket propellant and would "propel you across the mid-deck." That was the rumor, and one astronaut I interviewed said he didn't buy it, because he said that human lungs hold more air than the average fart, and when you exhale it doesn't blow you back, and so he didn't believe it. And he—he must have eaten a bunch of beans—he said he had "a real voluminous and rapidly expelled purge"—those were his words—and he said, "I failed to move noticeably." There's a debate among people I've talked to, but he said, no, he tried it. He was wearing pants, though, because it was a mixed-gender mission . . .

Hopefully he would wear pants anyway.

Yeah, but he thought that wearing the pants might have interfered with the cleanness of the expulsion and

compromised his thrust. So . . .

Not a valid experiment.

Yeah. He promised he'd ask other people, but I never heard back.

Do you know of any fistfights breaking out on space missions?

What I was told when I was in Star City is that fistfights —they have this term, a "friendly fistfight." Fistfights are kind of how you settle things, and it isn't a huge deal the way it would be here in the United States. And so I've heard that there have been fistfights on Mir, but I don't have the details. Somebody at NASA Ames told me that that's sometimes how they've solved disputes.

What would they do on the International Space Station if one person died, and the rest of the crew was still there?

If they were in orbit they could send up an orbiter like the shuttle and they could remove the body and bring it down,

and the family could do whatever they're going to do in terms of a memorial service. It becomes a little trickier if, say, you're on a Mars mission. It's an eight month trip, what are you going to do? I did a guest post on Boing Boing about this. There's a device, and it's just—there hasn't been a prototype built, but there was a paper that was done jointly with NASA and these folks I met when I was doing *Stiff*, who do the freeze-drying and composting method in Sweden. And they came up with something where basically you'd put the body in the airlock and freeze it solid, and then it would vibrate it into small pieces, and you'd put the powder in this little pod and basically pull it behind the spacecraft until you're reentering Earth's atmosphere. And then to keep it from cremating you'd bring it back on board, and then when you land you'd present it to the family. It would be small, something that could be carried by two people. It was called Body Back, that's the name of the system.

What are some of your favorite science fiction books and movies?

Oh, I loved *THX 1138*. I want to see that again. I just recently saw *Moon* with Sam Rockwell, which I liked a

lot. I'm a fan of Ray Bradbury, although not so much the space stuff. I like some of his stories, like that weird one where the guy gets his skeleton pulled out through his mouth by this woman who has—you know, her hair falling over her face in this sort of sexy way for the whole story, and then it turns out it's hiding this hideous mouthpiece that comes out. And "The Veldt," I love that story. *Red Mars*, by Kim Stanley Robinson. That was pretty impressive in terms of its accuracy. It seemed like a really accurate scenario for the psychological as well as the technological stuff. And 2001 obviously I love.

When you're talking to NASA employees and astronauts, did any of them ever talk about science fiction?

I do remember seeing a list of all the books that are on the International Space Station, and there's a ton of science fiction. There were a lot of science fiction books up there that people read, so clearly it's popular stuff for astronauts.

Were there any big misconceptions you had from watching movies about astronauts, so that when you

were doing research for this book anything came as a big surprise to you?

I had no idea until I started this book that when you're heading to the moon or to Mars, you're essentially coasting. I thought it was like a car where you'd have your foot on the gas the entire time, and I used to think, "Jesus, that's a lot of gas. How do they do that?" I didn't realize that the initial blast propels you, and you get escape velocity, and then you're just coasting because there's no air resistance, nothing to slow you down, so you just keep on coasting all the way. That was just amazing to me, and for some reason—maybe cartoons that show exhaust coming out of rockets—I had this misconception about how rockets worked.

I mean, that's really basic stuff. Just shows you how completely ignorant I am at the start of every book.

So are there any other recent or upcoming projects you're working on that you'd like to mention?

Oh, I am working on a new book, but I'm keeping it under my hat for now.

John Joseph Adams, in addition to serving as editor of *Lightspeed* and *Fantasy Magazine*, is the bestselling editor of many anthologies, such as *Brave New Worlds, Wastelands, The Living Dead, The Living Dead 2, By Blood We Live, Federations*, *The Improbable Adventures of Sherlock Holmes,* and *The Way of the Wizard.* He is a 2011 Hugo Award-nominee for Best Editor (Short Form), his books have been nominated for the World Fantasy Award, and he has been called "the reigning king of the anthology world" by Barnes & Noble.com. John is also the co-host of io9's *The Geek's Guide to the Galaxy* podcast. Find him on Twitter @johnjosephadams.

David Barr Kirtley has published fiction in magazines such as *Realms of Fantasy, Weird Tales*, *Lightspeed*, *Intergalactic Medicine Show*, *On Spec*, and *Cicada*, and in anthologies such as *New Voices in Science Fiction, Fantasy: The Best of the Year*, and *The Dragon Done It*. Recently he's contributed stories to several of John Joseph Adams's anthologies, including *The Living Dead*, *The Living Dead 2*, and *The Way of the Wizard*. He's attended numerous writing workshops, including Clarion, Odyssey, Viable Paradise, James Gunn's Center for the Study of Science Fiction, and Orson Scott Card's Writers Bootcamp, and he holds an MFA in screenwriting and fiction from the University of Southern California. He also teaches regularly at Alpha, a Pittsburgh-area science fiction workshop for young writers, and is the other co-host of *The Geek's Guide to the Galaxy*. He lives in New York.

Coming Attractions

Coming up in July, in *Lightspeed*, we have a reprint of the classic story “The Cold Equations” by Tom Godwin, plus an original story paying homage to it by new author Jake Kerr (“The Old Equations”). We’ll also be featuring new work by Kat Howard (“Sweet Sixteen”) and a reprint of “Face Value” by Karen Joy Fowler. All that plus our usual assortment of nonfiction and author spotlights. It’s another great issue, so be sure to check it out. And while you’re at it, tell a friend about *Lightspeed*!

Thanks for reading!