TENTH CONTACT

Bruce Sterling & Paul Di Filippo

Paul Di Filippo sold his first short story in 1977, so he is rapidly approaching his fiftieth anniversary in the field. He's done a bit better than a book a year—his latest story collection, *The Visionary Pageant and Other Stories* (Wildside, 2025), represents the fiftieth volume to his name. His current work in progress is titled *Phantoms of Brooklyn* and concerns a steampunk remnant found to be still operating in that current-day borough. Paul lives in Providence, Rhode Island, approximately two blocks from the granite marker signifying Lovecraft's birthplace, with his partner of decades, Deborah Newton, a black cocker spaniel named Moxie, and a calico cat named Sally. Bruce Sterling is a career science fiction writer and a sometime festival art director who unites his time in Turin, Belgrade, Ibiza, and Austin. He often blogs about trends in technology art and is @bruces on Bluesky, Xtwitter, and Medium. Recently Netflix has turned two of his cyberpunk Shaper-Mechanist stories, "Swarm" and "Spider Rose," into some quite weird animated cartoons. In the authors' latest tale for *Asimov's,* a motley trio of space pioneers battle the harshness of Ganymede and the dissension among themselves. This is all in the quest of the first alien life ever discovered by humanity—that is until the galaxy itself decides to erupt!

1.

Red roses over black ice.

Harpone bounded across a crater. He'd tumbled, leapt, and skidded over more of Ganymede than any man alive.

He would never match the service record of the dead kid, though.

Harpone's crewmates—Audax the intellectual and Consilience the administrator—they both insisted on all due honors. The dead astronaut was Ganymede's human monument, one frozen speck of flesh on a vast lunar plain.

It had been grave heresy to bury a man on a pristine moon so well-known to harbor alien life. The dead kid was human, and a contamination. A desecration, a defilement. Back on distant Earth, earnest public figures still recycled their pious ukases.

Harpone pulled his sinewy hands from the sleeves of his vacuum suit and scratched his ass. He was encased in atomically alloyed, biomimetic armor. This jointed life-support shell protected Harpone from Ganymede, but mostly, the official shell protected Ganymede from Harpone.

In his skipping, tumbling, rambling explorations, he was trailed by four robot dogs. This pack of sled-hounds had been built on-site from the local substance of Ganymede, meaning, mostly, granite-hard water-ice. The robot dogs were extremely capable, nativized, Ganymedean machines, with elaborate onboard instrumentation that no human body could match: vibration sensors, ice radars, multispectral cameras, molecular sniffers for the local dust and comet-snow.

These four dogs obeyed Harpone, but mostly, they were loyal to Ganymedean policy. They'd been trained to lick up every trace of Harpone if his suit ruptured.

Harpone capered along a broken, meteoric ridge, and confronted the astronaut's tomb. A monument to frozen political polarization, the ice mummy lay on a catafalque, exposed to the black sky stark naked.

The dead astronaut hero was still quite good-looking. Like some Pompeii victim slain by frost instead of lava, he'd swiftly freeze-dried. His bared flesh was tumescently frozen stiff, while his eyeballs, lips, and nostrils had big crystalline puffs of exotic frosting. He'd become his own statuary, caught forever in his final posture—fiercely gripping the snows of Ganymede with his two bare human hands.

The dead kid had once been a member of the Fourth Contact mission. The Fifth Contact mission had found him dead and dug him out of his snowbank (where he had quickly sunk half a meter into the moon because of his body heat).

The Sixth Contact had performed his funeral, while the Seventh had decorated his tomb.

Back on Earth, decade by decade, the twenty-second century faltered and jolted along, while fierce radiation blasts from Jupiter had pitted the dead man's knees and elbows. He was gently, delicately eroding, because his dense, exotic human flesh-ice was such a Ganymedean anomaly. Aurora radiation-fluxes softly chewed away at the human corners of him, mysterious yet persistent, like Saint Elmo's Fire in the rigging of some nineteenth-century sailing ship.

Harpone whistled up the robot dogs so they could document the proceedings. Tiptoeing with dramatic reverence, Harpone deposited his deep-frozen, blood red floral bouquet—a tribute grown by Consilience, and artistically arranged by Audax.

These dead roses were a tribute and a public affront, just as alien to Ganymede as the dead human astronaut himself. That was the point of the gesture.

Mankind's Tenth Contact Mission consisted of three people. Harpone, Audax, and Consilience, ill-assorted space-heroes who passed their long tours of duty deep in their sterilized castle, a labyrinthine fossil-mine in the depths of a fractured canyon.

As the chosen agents of mankind—astronauts, still human, but poised at the edge of human performance—Harpone, Consilience, and Audax were hard-put to get along. As the months ticked by, they sank ever deeper into their separate spiritual lives of hermetic personal temperament. They no longer spoke much. Their sense of heritage still united them, however.

Also, the presence of the life inside Ganymede was a source of unity. They'd never yet touched that life—"contacted it"—but they knew very well it was down there.

The very First Contact Mission had found fossil life forms—the remnants of marine creatures, stuck in an ancient rift in the crust of Ganymede. This fossil-mine had become the Ganymede Base, mankind's adventurous foxhole chipped and drilled into a mass of frozen ghosts.

The Second Contact had set up the ice-robots and the life-support factories.

The Third Contact had proved that Ganymede was a living world—the frozen surface was sterile, but the moon contained a vast, warm sea. Even through the ice, the seething water-life had many subtle "bio-signatures"—isotope ratios, masses of organic molecules, seismic, acoustic, and neutrino detection signals.

This life within Ganymede was colossal in scale, dwarfing all life on Earth, and it was pristine abyssal life—it had never been touched by human hands, although it was remotely tracked and cybernetically sensed. This life within Ganymede rhythmically moved in vast liquid shoals and tides, from the jagged undersides of the moon's ice crust, through vast, spinning, roiling sargassos and titanic gulf streams, down to the molten metal pits of Ganymede's simmering chemical core.

On the asteroid Ceres, simple bacteria had once lived. Plankton life oozed from moon Europa, and sometimes burst out in geyser-plumes. Big Ganymede was the biggest and oldest of the water-worlds. And the most frightening.

Earth's seas had more trash-plastic in their waters than they had living fish. But Ganymede's black, capped oceans were bigger than all of Earth's ruined seas.

Ganymede's life was also much older than Earth's life. Harpone, Audax, and Consilience were three unsought ambassadors at the court of a Hyper-Kraken.

Ganymede was more alive than the Earth. This was a cruel Copernican shock to human sensibilities. It was also a fact of life that astronauts had to comprehend, as the human representatives of a world ruled and ruined by humans.

The Fourth Contact Mission had suffered a fatality and lost equipment. The Fifth Contact was anticlimactic.

The Sixth began construction of a giant drill, which was called the EEL. The purpose of the EEL was to slither through sixteen kilometers of ice and to kidnap living creatures from the giant, black, internal seas of Ganymede.

The EEL was an instrument of direct human confrontation with an alien and hugely sophisticated ecology. The Eighth Contact was tender and tentative about going through with this act. Their orders and their funding came from Earth, where things were going poorly. Government will had collapsed, so dashing space-empire adventures were out of cultural fashion.

The Ninth Contact Mission was a three-year upgrade and maintenance of everything previously done. They'd double-checked the double-checking and rebuilt the rebuilding.

Then everyone was recalled, as the ruling Magna Mater Party splintered into the parliamentary factions of the Precautionary Party and the Transasteroidal Mining Authority.

Eventually, through the slow grinding of endless subcommittees, Harpone, Audax, and Consilience had arrived as the low-budget caretakers of a hugely complex ice palace, where all the aging bags and cartons contained much older bags and cartons, and the system's subsystems had outdated subsystems.

Harpone was a loner, but on Ganymede, estrangement from humanity was a core feature. Harpone even avoided the Base, with the same disdain that he held for humanity in general. Living within his suit, he roamed the moon's surface, hunting frozen fossils and taking dramatic, artistic alien-landscape shots.

Harpone had never seen Ganymede with his naked human eyeballs, since that act meant swift death. Instead, he perceived Ganymede through the perceptual filters of his suit. As the Contact Mission's official human artist, he was granted subjective

leeway to see the moon and present it to fans, in the long tradition of an "astronomical artist's impression."

During his loping, bounding treks, the talented Harpone had become the connoisseur of Ganymede's native light. A profoundly unearthly light, which shone from the indifferent, occasional, parched and shrunken Sun, and, always, tinted light oozing from Jupiter, the megaplanet fixed like iron in Ganymede's black sky.

On Earth, Harpone was famous. Strange women often offered to marry him and bear some Ganymedean children. That wouldn't happen. Vacuum spoke louder than words.

Harpone photographed the robot-carved ice tomb with all due care. As an artist, he sought ways to dignify mortality. To become an astronaut was to comprehend that annihilation by the Universe was, in itself, a dignity.

Astronauts died. They died on frontiers. They died because they confronted Nature untainted by human development—the genuine Cosmos. Astronauts died, not like other mortal men, but from explosive decompression, from high-velocity impacts; from fire inside a spacecraft, from power failures, from software failures. On rare occasions, they killed themselves or one another.

The dead astronaut on Ganymede had died from a threat that no human could foresee. While hunting fossils, he'd blundered into a patch of highly charged frost.

This "sulfate snow-lightning" was utterly unknown when the kid had been struck by it. In his own experience, this alien lightning blast was a silent explosion that maimed him and blew his spacesuit to shreds.

Then, briefly—very briefly—the human astronaut had capered naked through Ganymede's alien snows. As an astronaut-artist, Harpone had won himself a fandom, but the dead kid had a public cult. His devotees still gloated over his bold, balletic leaps (for the astronaut's robot ice-dogs had faithfully documented every second of his death throes).

Light-footed Harpone solemnly paced around the kid's sacred monument—leaping over it once, to obtain a nice overhead shot. He garnered images of heroic sacrifice-in-exploration, images to be savored by ambivalent, fretful Earthlings lurking in their storm bunkers.

Harpone had never aspired to become a fatal icon himself. But he was a committed astronaut. He knew how to do the job at hand.

With his funeral work completed, he whistled up the dogs to tackle his next assignment.

Harpone's next duty was to maintain the "EEL." He was the EEL's janitor more than its master, but he stayed hands-on with that machine.

The EEL had no great mystery for Harpone—he knew it too well, as a technical tangle of pumps and pipes, a flexible, powerful, medically sterilized, ice-piercing apparatus. The EEL was a slithering catheter, built to fish unwary Ganymede aliens from within their black sea.

When the aliens had been abducted, they would be transferred from the EEL and stored inside mankind's prepared aquarium. This long-empty, ornate structure, brought over by Contact Three, was called the "Goldfish Bowl." As a maintenance technician, Harpone was quite intimate with the Bowl, too. He'd been known to fill the Bowl with hot water and sleep in it, sometimes.

Harpone, Audax, and Consilience all understood the empty Goldfish Bowl as some strange, thematic reversal of the dead kid's ice sarcophagus. A monument to lost human life, and a human aspirational gesture toward life that had never yet been found.

As for the EEL, its condition was nominal. It functioned. It might well be the most dangerous machine ever built by mankind. Because it would pierce an icy membrane between living worlds.

The EEL might catch goldfish, or it might poke and annoy something else. Something very alive, something radically unpredictable, disruptive, cosmic. Hyperintelligent, maybe. A hyper-evolved, ancient genie from inside Jupiter's sealed moon-bottle. The "Hyper-Kraken" (because a political discussion needed striking terms of discourse).

Harpone ignored the tangled exigencies of Earthly Hyper-Kraken debates—mostly because, as a matter of visceral conviction, he was not so much pro-human as pro-hyperkraken.

Also—sometimes the world really was transformed. By an atomic bomb, for instance. When that happened, some callused worker-hand had to yank that lever on that bomb bay door. Harpone was that kind of guy.

Harpone had chosen that; he had been trained for that. Yet his dogs were restless. These too-wise machines were authentic to Ganymede. Every component within them was custom-designed for the extreme local conditions. As guard dogs, they stayed with the troubles.

The dogs angled their icy heads skyward and whined at storm-light.

2.

Dr. Audax took his brunch at the Base observation portal. The deep-buried window-inlet was a kind of anti-balcony, a baroquely armored peephole that gazed up toward a narrow black sky, stars and moons framed by the gray-maroon ice-slopes of a glacial purple crevasse.

This crevasse was a Ganymede "rill," where the native tectonic forces of Ganymede, gathering in all their tidal power eight hundred million years ago, had ripped a violent fault line through the moon's ice crust. Hot liquid seawater had gushed up in that cataclysm, and every living thing caught in this alien tsunami had promptly frozen and died.

Eons passed, and humans had arrived at that tomb and disinterred some of those fossils. This insulated fossil-mine was where Audax lived and performed his scientific duties. He perched like a starved owl on the edge of his chaise longue, while he thoughtfully savored his coconut, ginger, cinnamon, and anise pudding.

Audax survived mostly on pudding; he'd lost all appetite for solid Earthlike food. He'd lost weight, but the ascetic restraint had cleared his mind.

Audax was a cryovolcanologist. He understood how Ganymede's ice behaved, and was an expert on fossil hunts.

He collected, dissected, and studied the dead. He wasn't by training a biologist or paleontologist, but he was a distinguished fieldworker. He was well published in those disciplines. Dead things were named after him in Latin.

These fossil traces of Ganymede life were soft-bodied, all boneless, all headless. They were eight hundred million years old and crushed and warped by time and lunar catastrophe. They were "astrobiological signatures," more the traces of living creatures than the creatures themselves.

To any layman's eye, these mysterious aliens were mere puddings. Sedimental impressions, but then humanity's scientific method got to work on them.

The mashed puddings were revealed as delicate fronds, and tubes, and waffles, and such.

They closely resembled the "Ediacaran fauna" of the early Earth. Audax (concurring with the majority of scholars), believed that they *were* those Ediacaran fauna. Early Earth life and early Ganymede life were the same life forms in different Solar System environments.

A startling observation. It had changed humanity's conception of the heavens, in much the way that Galileo himself had once done, when he first spotted Ganymede with his transgressive telescope.

In his Earthly life, Audax had been a relentlessly ambitious careerist. He'd even become the cicisbeo of Airegin Rusha, the doyenne Votary Public of the Transasteroidal Authority. Not long after that mesalliance, Audax had been plucked from Earth's surface with a tether and flung past the Moon. He drowsed in his life-support tank past a close encounter with Venus and some blazing atmospheric braking over the South Pole of Jupiter, then he arrived featherlike at the icy gates of the Ganymede Base.

As an astronaut, he had achieved self-actualization. To contact alien life—that was the goal, after all—some scholar had to do fieldwork. Someone had to take specimens from their surroundings and weigh and measure and assemble the evidence.

That was the life dished out to Audax. A recycled life, contained on an alien world. For three years, Audax been eating the upgraded exudations of his own recycled self. He did this with strategic purpose. As an act of intellectual consistency.

As Audax dissected his grainy pudding with his gleaming tablespoon, in rushed Consilience.

"Harpone just fried himself in an aurora storm!"

"Again?"

"Yes, Harpone does this just to make our mission look bad!"

Audax licked his spoon and set it aside. "Harpone didn't drop dead at that grave, did he? Our mission needs glamor coverage. Next week there's a Parliament hearing."

"Harpone is still alive. Technically."

Audax had to abandon his meal, shed his bathrobe, assume his uniform, and confront the mission crisis.

Harpone's four ice-dogs had galloped at their best speed over crater and crevasse. They had delivered Harpone back to the Base, semi-conscious, weak, stricken, and very sick.

Inside the Base airlock, Harpone's dogs steamed like four ice-statues of dogs from Hell. They stank of ammonia.

Audax shooed the reeking dogs outside while Consilience extracted Harpone from his suit. Harpone's flesh, peeled from the depths of the buzzing, unhappy humaniform capsule, was much-tainted with sweat and vomit.

Audax and Consilience hauled Harpone downhill through an ornate Base corridor-tunnel, where they slid him into the medical support tank.

The intensive-care vat was designed with the same philosophy as Harpone's space suit, the Goldfish Bowl, and the Ganymede Base itself. This flexing, carnivorous device simply gulped Harpone like a water-frog eating a beetle.

"Do you suppose he'll die again?" said Consilience.

"As a scientist, I hate to speculate," Audax lied. "Also, we all agreed that we would classify any such Harpone incident as a 'coma.' Harpone has never been a mission fatality."

"That's what my official records will state, but Harpone just screwed us up again. It's shameful."

"Look here," said Audax, his mild tone sharpening, "off the record, this damn fool is the star of our show. You do your job, I'll do my job, and if that life-support tank can knit up his mangled tissues, then he'll do his job."

"He pushed the limits too hard. He broke like a soap bubble."

"That's the astronaut tradition."

"He's become an addict of that process," said Consilience. "A man can't become what a man can't become."

"If I may quote the philosophers, 'What is a man?' At least he's in a healthy hell."

Audax himself had suffered the aid of the life-support tank—once. His years on Ganymede—every scrap of food, drop of water, air, and light artificially processed—had sent him into a heart arrhythmia.

The tank had promptly cured Audax through the simple method of glaring at every living cell within his body and killing anything problematic. Searing chemotherapy in a black amniotic womb.

"What will be left of Harpone when he comes out again?" said Consilience.

"Why speculate? What do the instruments say?"

"The records say our wild man took four hundred rem out there."

"That much? Four hundred?"

"That's the data."

"A reading like that makes no sense. It must be a fluke."

Consilience peered at the personal tablet cradled in his thick fingers. "His suit is wrecked. Even the ice-dogs need repair."

Audax hastened to the nearest office, where he performed checks among the tangle of instruments catalogued on and off-site. Thirty years' worth of precious scientific hardware, imported from the distant Earth. Each piece unique. No two alike. For a scientist-astronaut, such was daily life.

"This is bad," he said. "We're taking fifty rem of exposure right now, and we're living deep under the ice."

Consilience spoke up from his own console, which was dedicated to mission continuity. "No event in three decades of records has ever looked this severe."

"Then we'll be feeling what our comrade just got. First, those flashes of light in our eyeballs, then the fever, diarrhea, hair loss . . ."

"That's all in the medical manual, we know the risks," shrugged Consilience. "Tell me the nature of this anomalous event."

Audax turned his attention to various far-flung instruments on the moon's surface. He accessed a distinct set of other instruments, in orbit above Ganymede. Then he queried yet more instruments maneuvering within the Jovian system.

Jupiter boasted ninety-five different moons and many lumps of smaller slag. Quite a lot of hardware had been scattered there by a lastingly curious mankind.

"I don't mind radiation," Audax lied, "since that's a basic aspect of our noble calling. However, our science instruments are also being fried and blasted, and that makes me angry."

"Be practical," urged Consilience.

"Our beloved network—with its many failsafes and its distinctly separated systems—seems to be turning to junk all at once."

"Resolve that apparent anomaly, Dr. Audax. Our comrade wasn't fried by a software glitch."

As Audax searched through his stricken data in hope of some rational conclusion, howls of human distress arrived out of the speakers. Bewildered laments, one after another, stretched across the long light-minutes of the Solar System.

These wretches were asteroid miners. These roughnecks lacked the cultural prestige of astronauts, because they pried metals from orbiting rocks for money. They weren't profiting at the moment. Instead, they were hiding and dying.

Hours passed, things got worse. Rumors, shrieks of horror, denial, prayers. The tragedy of the human condition. Robot instruments did not complain in that way. They "died," but they didn't suffer.

"'A disaster that is bigger than Jupiter,'" Consilience repeated. "I have never heard those words said before. That's amazing."

"The first reports of any massive disaster are always confused."

"I'm startled, but I'm not confused," said Consilience. "Those were historic words. 'A disaster bigger than Jupiter.' Those words have the astronaut ring about them."

Audax patted his console. "To quote the classic philosophers: 'Extraordinary claims require extraordinary evidence.' And evidence is piling in."

"Well, then, what is it? What the hell is happening?"

"It's quite the event. When I was a young science student, I used to dream of a Karl Popper-style lucky break like this. A total shattering of the established consensus. The scholar must rocket into the creation of new paradigms."

"Just say it, Audax. Use simple words."

"I really shouldn't say this," said Audax, "since no proper scientist should ever indulge in populist, off the cuff, factually unsupported speculations."

Consilience gritted his teeth. "Right."

"Laymen always demand that of us scientists. However, it's morally wrong of us to indulge their squalid alarmism."

"I know all that," said Consilience. "That's why the Earth is in ruin while my own family are climate refugees."

"It's ethics. Don't take it personally. We're having an aurora storm—that's why Harpone almost died. But the aurora storms here on Ganymede come from the magnetic field of Jupiter."

"I'm a Ganymede veteran. Get on with it."

"The 'Heliospheric Current Sheet' is bigger than Jupiter. That's the Sun's own magnetic field. It's the biggest structure in the Solar System. It's a giant, uncoiling whirl of plasma and ionized gas. A beautiful solar spiral that stretches out toward the stars."

"Now you're talking sense," said Consilience. "Even my kids would understand that."

"I have a hypothesis. Tentative. Preliminary. It's all about magnetic fields. Jupiter has blasted Ganymede; we know that's true. But the Sun can blast Jupiter, and that's happening. The Sun's Heliospheric Current Sheet is bending like a soap bubble. Why?"

"All right," said Consilience, "go ahead, clue me in."

"The Heliospheric Current Sheet is extremely big, but there are magnetic fields even bigger. Galactic weather."

"So it's a galactic aurora storm," said Consilience.

"I wouldn't use that term. Because you just invented that term right now, and that's not real science."

"Has such an event ever happened before?"

"Yes it has. Certainly. Every twenty million years or so, the Sun runs into some galactic dust cloud. That's the way the Milky Way Galaxy is constructed."

"Twenty million years," said Consilience, "and yet somehow you, and I, and Harpone in the tank there, are the astronauts on duty."

"I admit that my hypothesis is farfetched. I'd like better evidence."

"Better evidence than screams of woe from across the Solar System, and hundreds of machines burned out? We're astronauts! Wake up, Audax! How long do galactic storms last?"

"I don't know that. I'm not a galactic astrophysicist. I'm just a humble ice-volcanologist."

"How dangerous is this storm?"

"We'll find out. We're the pioneers in a galactic catastrophe."

Consilence paused. "Will my family on Earth die, do you think?"

Audax, who had no children, spoke kindly. "I imagine not. Because Earth has a

powerful magnetic field—as small planets go. And the Sun's Heliospheric Current Sheet is thinner here on Jupiter, but it's quite strong around the Earth."

"You're just saying that to make me feel better."

"Well, that's why scientists shouldn't talk in this way. Your family will be concerned, of course. Anxious. About you, mostly. And—since we are space pioneers—everyone on Earth will be looking to us for guidance."

Consilience thought this over. Then he spoke in a new tone.

"I'm glad that we've had this discussion, Dr. Audax. That was illuminating, and it has practical implications. You're our scientist, and I'm sure you'll have new findings for us soon. In the meantime: we're in a crisis. The size, the duration, not yet known. But we do know it's a storm, and we know it's big. For a big storm, our Mission has well-established protocols."

Audax nodded silently.

"We buckle in, Audax. For the duration of the lockdown, I will be taking command."

Audax mutely saluted.

Consilience had never faced any trouble as big as "galactic weather," but he was a climate-crisis orphan. His parents had drowned in a European monsoon. Consilience had been fostered in the Magna Mater crèches as a ward of the state.

As the foster child of a troubled civilization, he'd received extensive ecocybernetic sermons, many syllabi, a little camaraderie, and less love.

As a young cadet in the astronaut corps, though, his wary self-reliance had served him well. His sense of duty gave him moral backbone: he had honor; he was accountable.

Astronaut life was 90 percent about following the checklists. Ten percent was about raw extremity.

"To our misfortune," Consilience told his subordinate, Audax, "we've already taken one casualty among our scanty crew of three. You and I will also be hurt, while nursing our stricken crewmate, while sustaining a storm siege."

Audax had a stoic expression on his owl-beaked face. "Sir, it's do or die."

"Less emotional speculation, more hard work, Audax. To our labors."

Consilience led the retreat into the depths of the Base. He backed up systems, shut down generators, pared back air, light, and fluid flows. He stockpiled and assembled rations, air filters, and some rudely direct urinal/potable water fountains.

He and Audax, with much awkward struggle, transported Harpone's life-support tank from the upper floors and down to the relative safety of the emergency control room. Harpone's support-tank squatted next to the Goldfish Bowl, where the tank continued to subject Harpone to a harsh, accelerated healing.

This was methodical, militant action, like preparing some historic, military, nuclear Nautilus submarine for a long, deep dive. Consilience was, in fact, the commander of nuclear weapons. His Base was equipped with two hydrogen bombs, long-stored in the deepest silo below the central control room, under the long-empty Goldfish Bowl.

These two cosmic explosives had been installed on Ganymede from a classical "excess of caution." The armed bombs were placed there in case the ancient life inside Ganymede did something truly unknowable, unthinkable, and cosmically horrific.

Humanity's cosmic bombs were not designed to harm any creature inside Ganymede, but to annihilate the human camp on the moon's surface. This somber feat had been thought through with much political care, with much stark "Think-the-Unthinkable" scenario work.

Consilience had been fully briefed on this reasoning. Suppose that—hypothetical-

ly—unthinkably dangerous, ultra-evolved, conjectural monsters inside Ganymede roused themselves to confront the human invaders. Before those unthinkably smart and powerful hyperkrakens could "counter-contact" humanity (with many horrifying theoretical prospects), humanity's best Unthinkable Bombs would explode on the spot.

Then the hyperkrakens would find no humans to "contact." No evidence of human intrusion, just a mysterious smoking steam pit on their moon's surface. No pointers back to the invaders.

The "Goldfish Bowl" was still entirely unused, but, under the direction of Consilience, it now doubled as an emergency freezer, holding Ganymede's precious fossil evidence. These primitive hyperkrakens from another era were ice-fossils, and even when warmed by human study, they were very cold.

The working trio of Harpone, Audax, and Consilience, assisted by the robot dogs, had acquired icy tons of these squashed, blurry, ancient specimens. Harpone was the sharp-eyed prospector, Consilience the engineer-director, and Audax the scholar-analyst.

Their troves of fossils had been sought out and found in Ganymede's deepest rills, most violent water-volcanoes, and largest comet-craters. All these fossils, chipped stone dead from their long-frozen ores, were entirely real and physical, but warped by geologic time.

Holy terrors of astrobiological paleontology, these ice-chiseled, excavated specimens were distorted seaweedy entities, otherworldly alien bioforms of fronds, tubes, loops, and ovoids, tentatively grouped by humans into various phyla, classes, orders, and families. Most were quite modest life forms, small and meek, often spiraled like garden snails. Others were as big as bathmats and apparently furred.

Preserved in their chilly Goldfish Bowl vitrine, these sub-icy black-ocean beasts were arcane and unnerving. They seemed twice as scary when the black skies over Ganymede were convulsed with galactic mists and alien lightning.

As the captain of a fortress under siege, Consilience mapped the threats to survival. His best instruments were blinded, but even in a storm, some worked partially.

Provoked by some vast disturbance, Jupiter was lashing Ganymede with radiation. Most of these lethal energies were sleeting into the moon's north and south poles. Normal auroras on Ganymede had always behaved in that way, but these violent aurora-energies were whipping right into the moon's naked surface. They scattered electrified fountains of water-methane, carbon dioxide, and pulverized stone.

Under the searing aurora-lights, the eldritch ionized mists flittered and skittered in Ganymede's light gravity, as ionized clouds that flung lightning bolts.

As these clouds thickened, they formed a strange, distinct, global-warming effluent. During all this mayhem, the distant Sun continued to shine on Ganymede. The Sun's heat pushed wave fronts of radioactive smog.

Patching his chunks of data, and simulating when needed, Consilience was able to roughly forecast Ganymede's brand-new, atmospheric weather. The moon's climate had suddenly and violently changed.

When Consilience ventured to a subterranean balcony, he could see with his own eyes that it was raining over the Base. Not warm Earthly rainfall, of course, but a flooding tarry slush of methane, ethane, and ionized hydrocarbons. This aurora-blasted goop dripped and sloshed and roiled and pooled deep in their valley rill, and it froze solid there.

Audax was obedient when commanded to action, but, as a scientist, he was too curious to be well disciplined. The owlish scholar was anxious for news from the outside world. Nothing that he heard was good.

"Even Brazil is seeing white fire in the sky," he mourned.

"It's not our present duty to map every howl and scream," Consilience counseled him. "You're an astronaut scientist, and you can't console Earthlings with easy answers! Concentrate on your duty, and get the best data from the best instruments that you can trust."

"We had such good machines once," moaned Audax, "I never appreciated them until I had lost them. They were never designed to confront the Unknown-Unknown."

Audax suddenly seemed thinner than ever, and his puffy hair was falling out from his radiation exposure.

"Audax, you need to be of better heart. You're bewildering yourself with your own jargon. 'Unknown-Unknown,' where's the common sense in that? This extremely large and bad event needs a much better name."

"The astrophysicists are calling it 'The Local Bubble High Speed Gaseous Discontinuity.' "

Consilience blinked. "What good is that?"

"Because that's what it really is. Now we know, it's been proved, that this storm is a fast-moving gas-plume intruding into the Local Bubble of the Milky Way."

"Fine. It will just be called 'The Bubble,' then."

"It's a frothy soap bubble of ionized gas, along with debris, that was blown our way from the pulsar Geminga in the constellation Gemini."

"Well, we should have seen that coming. Humanity was careless."

"It was seen, but it was never understood—not until it hit us. Nobody trusted the strange instrument readings. I can't blame them—because I don't trust our own instruments. They can't work through aurora bursts, and landslides, and lightning, and frost-waves, and micrometeors."

"How about the EEL?" said Consilience.

"Oh yes, our beloved EEL drill," said Audax. "Without that EEL, we're Geneva with no cyclotron. We're Paris with no Eiffel Tower."

"With our Base secured, our next priority must be the EEL."

The EEL was well-instrumented remotely, but given the ongoing aurora disaster, the EEL's readings couldn't be trusted.

"We could send out the robot dogs to sniff around the EEL," said Audax, but his voice held no conviction.

"That EEL is too precious for that," said Consilience. "It's thirty years of tech development. Millions of man-hours. I'll have to venture out and see what can be done at our worksite." He paused. "I may be some time."

At this declaration, Audax balked. "That's Harpone's job."

"Harpone is unfit now."

"I agree that the job should be done. The EEL is as important as you say. Harpone might conceivably have managed the EEL, because he's well trained and he's very skilled in surface maneuvers. But not you."

"We swore an oath. We wear the uniform."

"I understand that we're astronauts. I know our lives are a minor matter. Over our head, there's a galactic storm. Deep under our feet, there's a giant ocean full of unknowable monsters. We're sitting in a tiny bomb shelter, on top of bombs designed to erase this Base with no trace. In these circumstances, I feel compelled to speak out as the voice of reason."

"All right," said Consilience. "Since you'd do it anyway, speak your piece."

"Reasonably—seriously—we don't have to do this. We don't have to rise to this occasion, and be astronaut-heroes. We can temporize, instead. We can delay. We're not the 'First Contact' with aliens. The truth is, we're the Tenth Contact! We can choose to kick it down the road. Let someone else do it."

"Do nothing at all, that's your counsel?"

"More or less. To justify our lack of action, we can plead our circumstances. Objectively, our Mission is in bad shape. Our local EEL expert is wounded, there's a huge storm outside . . . if we refused our agency and simply postponed a decision, what's the worst that can happen to us?"

"We smother to death in here? Like cowards? In the dark?"

"Oh, that's not so bad—that's just death. I'm not talking melodrama. I'm talking about a moral choice. If we don't die as astronauts, we'll live. The truth is, if we do live, we can't remain astronauts. We'll return to Earth. We wouldn't be shamed or blamed there, we'd just be forgotten. Three men who are part of the crowd. We'd be civilians."

"Part of the crowd. Civilians," Consilience repeated.

"I know it sounds meager, but it's part of our heritage," Audax argued, "to become a civilian again is the authentic human astronaut tradition."

"Is that what you want?"

"I don't know. It's a choice. We might choose to become frozen monuments to ourselves in three catafalques on alien soil. But imagine that we choose to go home! Harpone returns to his thrill-sports and extreme skin diving. I go back to Paris; I teach ice-physics in some university. You go back to Berlin to your family. You raise the children."

"How could I face them? My children."

"They're just children. They won't be orphans. They don't care about anything else, not as much as you think."

There was a contemplative silence.

"Is that all you have to say about this matter?" said Consilience.

"Well—yes. I can think; that's a talent of mine. Also, I can talk. But I don't know what we should actually do."

Consilience silently set to work to change over the functionality of the Goldfish Bowl. Audax cooperated. Once emptied of fossils, it would become a friendly biome-simulator for Ganymedean life.

3.

Harpone had abandoned the bounds of physical reality. He capered in his medicated dreamscape.

Floating within the hot, sizzling bubbles of his black medical tank, beset with ultra-potent cybernetic healing mechanisms, Harpone was deep in medical coma.

He knew that he was stricken, but he'd conflated this state with Earthly dream-memories.

He was dream-reliving a daring misadventure of his youth, back when Harpone had been teenaged, eccentric, wealthy, and indifferent to human constraints. In search of some jaded thrill, he'd dived from a chartered yacht into a poorly explored hot crevasse on the floor of the Mediterranean Sea.

This wild place was a "mud volcano," a thermal vent from Earth's tectonic plate. In this primeval, pitchy darkness, the feverish, bubbling crevasse endlessly vomited streams of hot, living slime. Subterranean single-celled organisms, ancient, blind, chemosynthetic.

These sulfurous bugs had never yet been defiled by the too-busy hands of mankind; they were ancient extremophiles, potent and blind—Earth's closest living relatives to the life that thrived beneath the ice of distant worlds.

Despite this, or maybe because of this, nobody much bothered about exploring

"mud volcanoes." So Harpone felt hotly driven to trespass there. With covert, voyeuristic ingenuity, he'd cobbled together a scuba hack and descended alone.

He groped there in hot blackness, at the edge of human survival, fingering webby tides of goo and blistering-hot sticky muck. Just fingering this hidden, primal vent. It was a thing lads did.

Then his oxygen shut down. He realized he was sure to die. He suffered a horrific attack of panic—not his first one—and then, through mere dumb luck, a valve unkinked, and he could live and breathe.

As his human life resumed, he felt an emotion new to him—an extrahuman sense of divine expectation. An awareness that he'd found the weirdest thing that his home planet had to offer, and though it was plenty weird, it just wasn't weird enough.

He wanted Ganymede assaulted, broken open. He wanted the rawest, fastest form of gratification. The smash-and-grab. An armored fist through the plate-glass of Ganymede. A vast steaming wound in the crust of the moon, an open scab of sea for a man to sail on.

A voice broke into his dream memories. "Are you awake?"

"I might be. Where am I? What time is it?"

"This is nine A.M. on April 12, 2153, and you're inside a medical support tank within a submerged ice palace on Ganymede, a moon of Jupiter."

"I see. Yes. That all makes sense. Also, you must be Audax."

"Yes, it's me. Your parameters are surging in there, Harpone. You're having some kind of fit."

"That's how it goes."

"Your lungs are full of support fluid, and an AI is reading your voice directly from your brain. Now listen to me. You were badly injured on duty, and we've had to accelerate your healing process. You're stewing in your hot bath of medical hell in there, but outside here, on the ice-moon, there's rather more hell occurring, on a much, much larger scale."

"I had a dream. About Ganymede."

"Brace yourself for a nightmare."

Harpone thought this over, with the black rags of his dream-state clinging to his brain like ghostly medical leeches. "I feel like I'm blind drunk," he announced, "and I got beaten up and then had sex with the nurse. I am sky high. I'm hallucinating, and I know that. My bones are made of buzzing beeswax."

"You're getting better. We're draining the tank. We're putting you back on your feet, on duty. Consilience and I require your unique vision of our mission's imperatives."

Harpone's decanting took four hours. He could no longer stand, even in the light gravity of Ganymede, but he was composed and capable. He sat and worked on properly breathing again. A rubbery black limpet attached to his chest filled his bloodstream with nutrients.

"Where's the rest of me?" he inquired.

"You've just survived a galactic disaster. So yes, you're skin and bones. But you will get better, and also, you've become very famous. It's quite a feat that you toughed-out such big mayhem. The public is impressed."

Harpone examined his two bare feet, which were so deprived of flesh that they resembled the flippers of a deep sea animal. "I'm a living skeleton! What does my face look like?"

"Let's not borrow that trouble just yet," said Audax kindly. "Back on Earth, the medical cosmetics are superb, so a hero like you can choose any face that you like. At the moment, though, we need your best advice."

"What's gone so wrong with our Mission?"

"Well," ventured Audax quietly, "just suppose—that as a scientist, speaking hypothetically, in a situation hard to summarize—suppose that, while you were healing and dreaming inside that tank, Consilience and I have performed some extensive and illicit maneuvers with the EEL drill."

"You are not qualified or cleared to mess with the EEL."

"Harpone, that's true. And I wouldn't claim that we did a good job, either. But there's a severe storm going on, the worst ever seen on this moon. If the EEL is destroyed by that storm, then a hole seventeen kilometers deep will freeze solid. Mankind will have to start all over with the Mission. Therefore, we have powered the EEL to break through the remaining meters of ice and to seize some specimens. To make the Contact."

Harpone thought this over. "What are those rumbling noises?"

"I haven't yet mentioned all the collateral damage to our Base."

"Where is Consilience? Is Consilience still sane? Can I talk to him, instead of you?"

"Consilience ventured outside to the EEL. He's living in his suit, among the dogs. He suffered much radiation, so he's in bad shape. But he believes the EEL is ready for the act of alien contact. He's standing ready to commit that act. That is, if you examine the instruments, and also give the go-ahead."

"Give me the big picture here, Audax. Why are you doing something this reckless? Put it into one sentence."

"Well, in one sentence, we're in a crisis of galactic climate change."

"Why in hell is that our fault?"

"Well, it's not precisely our fault, but it is nonetheless a crisis. Space-disaster is forcing our hands. Either we make the Contact, or else we shut down our Mission. It's use it or lose it. That's a desperate action, so it requires a clear moral decision. We need you to formally agree in this very consequential matter." Audax sighed. "Or else, we'll need you to place us both under arrest."

"I knew that new storm was plenty bad when the dogs dragged me back," said Harpone. "But I didn't expect to face anything like this."

"I regret that you've confronted so much trouble so suddenly," said Audax. "I would be kinder about if I could, but those are the heartless parameters of a stark human collision with Nature. Sometimes we see Nature coming. Sometimes for a couple of centuries. Generally, we choose to ignore Nature. Sometimes Nature kicks our ass in two weeks. Two days. Two hours!"

Some roaring and squeaking exterior to the station occurred. This was unpleasant because, for three years, the airless surface of Ganymede had been utterly silent.

"We are being hit," said Audax, "by a high-speed cloud of gas from a nova explosion. It was a local star—one of our own Sun's older relatives—that blew up. Stars do that. It blew itself to cosmic smithereens within the precincts of our stellar neighborhood. Like a dandelion puffed by the wind."

"When will it stop?"

"That matter's still under debate. It took forty million years for the first stormy tendrils of it to get here."

Harpone lifted both his skinny arms. "Those were 'stormy tendrils,' eh? I got fried into a living skeleton by 'stormy tendrils'?"

"Yes, and all this noise is just the first, gentle part of it."

"What's the rest of it?"

Audax sighed. "Don't tell anybody that I speculated. This is star-seed pollen. All right? It's 'litho-panspermia.' It's living rubble from a dead star and its planets, blasted across the galaxy, and arriving here."

"What the hell."

"It's the natural life that is native to the Milky Way. An older episode of this life,

which seeded the Earth, came by here three billion years ago. This is a new seeding of galactic life—the first one human beings can witness. That life came here from a stellar explosion inside the Carina Star-Cluster."

"I've never even heard of the Carina Star-Cluster."

"Well, it's certainly world-famous by now. Since panspermia is galactic biology, life evolves fastest inside the star-clusters. Because the clustered stars are close together. New habitats are easy for space-germs to reach."

"I had nothing to do with any of this. I was unconscious and dreaming."

"Harpone, how about eating a little something? Consilience has shut down our food synthesizers to save energy, but we've stored a whole stack of protein bricks."

Harpone considered his life over his bowl of flavored, tofu-like crumbles. He was not in any active pain, because neural analgesics had seen to that, but he could feel that his human body was a strange patchwork of upgraded ruin. His gut feeling about his own guts felt especially dank and peculiar. "Audax, you've never been this weird. But—I'm pleased to see you so involved with your game. It touches me that you seem so fulfilled."

Audax hesitated. "I'm pleased by how quickly the scientific community has responded to this general crisis. There are many aspects of this situation that I can't tell you about, simply because they change every hour. We seem to have unknown, natural creatures raining on our heads—and in the meantime, there are unknown living creatures in a huge sea under our feet."

"Maybe," said Harpone, "in our many months of duty together, you and I should have been closer confidantes."

"Well, as the philosophers say—even in a billion-year spree, there's no time like the present."

Harpone ate a few bites and then went to face the remote-control boards for the instruments of the EEL. He was entirely familiar with the ins-and-outs of the EEL. He was facing a ruin worse than his own human flesh.

"You've made an almighty mess of it. Did you have any orders to hack the poor EEL?"

"No orders arriving. There's no one in authority who can issue such an order. They'll never tell us to raid the oceans of Ganymede and retrieve live samples in an emergency."

"A matter for the experts on site, then."

"We're ready to do it. We've only been waiting for you to concur."

"How strange. This is just what I was dreaming about while I was in the tank."

"All three of us dream about it. Of course we do. How could we not? We're the Tenth Contact."

"No clearances for us, eh? No official permission? No offsite help, no safety checklists? Those Earthling do-gooders, they have not condescended to give their imprimatur?"

"Parliament has collapsed."

"That figures."

"They're trying to form emergency committees to protect the Earth from galactic assaults. They're in panic. Whatever we do, they'll blame us later."

"This is mutiny."

"It's even worse than just mutiny. Consilience might yank the wrong lever out there, and then thirty years of hard work blows up on the spot. All our hopes and plans, broken like a soap bubble."

"Well then," said Harpone, "there must be many scholarly reasons for us to continue your important considerations here, but shut up, Audax. We do it right away. Obviously."

"I felt sure you would say that, but morally and ethically, Consilience and I didn't want to involve you without your informed consent."

"We do it."

"We hesitated. We've been waiting for the general situation to become even more desperate. So that we'll have better political cover for our decision."

"Go lie down, Audax. Hide under a lab table. I already chose my glorious astronaut slogan! 'I claim this trophy to solemnify humanity's folly on this icy rock!' "

"Your slogan is good."

"I made that up when I was nineteen."

"That's the best thing about it."

4.

The living sample was safely sealed inside the Goldfish Bowl.

"Well," said Consilience, who was battered and swollen, but nowhere near as harmed as Harpone had been, thanks to a jury-rigged pocket magnetosphere. "We've achieved our Mission. Our Tenth Contact team has officially contacted alien life."

"Yes, we three did it," said Audax, "but our deed can never be 'official' until we have officially announced to mankind that we have committed this deed."

"Don't spoil it," said Harpone, taking endless photographs. "This is my life's crowning achievement."

Harpone was not so much healed as reconstructed. His face was bones and beak, and his muscle had dwindled into sinew, and his patchy new skin was dappled like a giraffe. But he was alive, and it was now poor Consilience paying the price of grave injury for human adventure on Ganymede.

"Before Consilience enters that medical tank," said Audax, "which is where he'll lie dreaming—we must decide which man among the three of us will take the most blame, credit, and political heat."

Consilience raised his swollen, skin-inflamed hand. "I am the Base commander, so of course I face that responsibility."

"That's simple, and it's sensible, but if we frame this as a military matter, you'll be crushed for that."

"I'll do the mutiny for us," Harpone volunteered. "I'm the one who hacked the software on the EEL and jabbed the machine through the ice."

"That was a criminal act, Harpone. We can't pay for criminal damages to the EEL, that device is priceless. We'll have to say it was me."

"But Audax," said Consilience, "you didn't do anything to make Contact except to think, talk, and make lunch for us."

"That's what's good about it. We've been three hard-case, analog roughnecks blasting our way through that last stretch of ice—but we can't admit that. Not in the court of public opinion. If we say we took command, that's mutiny. If we say we grabbed a sample, that's theft. If we say that contacting aliens was a strictly scientific decision to derive the best results from our experimental hardware, well, then that's a scientific controversy."

Consilience tried to speak, suffered a coughing fit, and caught his breath. Harpone pounded his back. "Audax is good at thinking ahead."

"It's clever," Consilience coughed, "but it's conniving. It's dishonest."

Audax stared Consilience down. "Do you, personally, want to write the formal, official report of alien contact?"

"I'm far too sick."

"How about you, Harpone? Are you in a writing mood?"

"I'd rather die," said Harpone cheerfully. "Commander, into the sick-tank. Scholar, write our damn paperwork. I'll run things around here."

Genuine contact with truly alien life was a shocking advent. The official news, as composed by Audax, should have ranked with a manned Moon landing or the detonation of an atomic bomb. In some ways it really did, but, like those other cosmically significant events, it was also part of the tumult of daily life. Especially in these fraught times.

Audax had framed the event in a smooth and well-considered way. He was dry and specific about the goings on: the "Tenth Contact" consisted of 750 liters of seawater that contained "microbes" and "plankton." Perhaps these soft, tiny, Ganymede organisms would remain alive "in their difficult new conditions as laboratory specimens."

People cared about this news, but they lacked a good dramatic structure for expressing their emotional reaction to it. The intellectual elite were horrified, but the conventional, common-sense public response was along the lines of "Congratulations, I guess! Get back to us about those tiny microbes."

Audax had not lied about the aliens; he'd merely chosen to diffuse the shock. The alien organisms growing in the Goldfish Bowl were by no means "plankton" or "microbes." They were extremely advanced, highly evolved, chemosynthetic creatures.

The least Earthly thing about them was that they grew in pitch darkness. They had never endured one photon of sunlight.

And yet, they were intensely colorful. "They"—(or "it" or "them")—had riotous, coral-reef visual qualities, even though they lacked eyes, or ears, or bones, or mouths, or even clearly defined boundaries to their bodies.

They clearly had organs. Their behavior was elaborately patterned. They lacked aggressive spines, armor, claws, or fangs, but they did have skins, surfaces, and permeable perimeters; they had behaviors, etiquettes even, of growths, divisions, and also some unmistakably sexual fusings.

It was hard to know if these vividly living things were "doing well," because there were no established baselines for their behaviors. They were hermetically sealed inside the Goldfish Bowl. The astronauts could never touch them. Only rely on the feed from numerous sensors.

As the days passed, stuck in their blind-men-with-Ganymedean-elephant predicament, the three astronauts fully shared their impressions.

Harpone said, "This is alien life, but it's wildlife, we fished it up with a net. We've got plenty, so we should pull a few out of that Bowl. Dissect them. Maybe eat them."

Consilience was still within the life-support tank, the machine that was a design-sister of the Goldfish Bowl. He was subjected to intense medical regimens in there, which affected his thinking. "I can see that they need better management," he opined, with his brainwaves. "Heat, salinity, atmospheric pressure, we should carefully alter those parameters and see how the beasts respond."

"I suspect they are 'intelligent' in some way we humans don't comprehend," Audax cautioned. "They do lack eyes, bones, brains, or hands, but I ask you: why would they need them?"

The captive, and captivating, Ganymedean creatures needed some useful name, so the astronauts called them the Goldfish.

The Bowl had many built-in instruments of biological study. These precise and delicate devices were rather glitchy from radiation, but they were better off than the much-battered instruments on Ganymede's surface or in Ganymede orbit.

These infrared lasers, resonance imagers, electromyographs, magnetic resonators,

impedance tomographs, and neutrino beams—they did not subject the delicate creatures to harsh visible light. But the instruments carried out many inquiries. Their data soon firmly established that the Goldfish were made from the everyday, conventional, biological elements: carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur, arranged in the customary carbohydrates, lipids, amino acids, and proteins.

These creatures had genetic structures, not precisely identical to Earth DNA, but closely related, because they were assembled from guanine, thymine, cytosine, and adenine, and coiled up in DNA helices.

They had living metabolisms—they "ate," more or less. They didn't bother to breathe, because their ancient sea had always lacked any poisonous oxygen.

They also presented strange anomalies. The oddest was that they seemed to be radiating more energy than the measurements suggested they consumed. Maybe a violent anomaly. Maybe 2 percent more.

This seemed to violate the laws of biology and also physics, so how could mere animals ever present such a thing?

"They're grabbing something, and they're eating it, but we don't see them doing that," judged Harpone. "Maybe they're corroding the walls of the Goldfish Bowl—to gnaw their way out."

"The planet Jupiter gives off more energy than it ever receives from the Sun," Consilience mused, while dreaming in his sick-tank. "Most energy on Ganymede comes from Jupiter. So they have evolved to organize that; it's their nature."

"We humans don't fully understand what a living metabolism is," Audax surmised. "These beings have evolved to metabolize energies beyond the physics we know."

None of the Goldfish visibly died from the stress of their captivity, but many seemed to voluntarily disintegrate. Some kind of apoptosis, where they broke into constituent colored polyps, which were slowly absorbed by colleague Goldfish.

They had no predator-and-prey behavior. They had otherworldly vitality, but no struggle for survival.

"Maybe," said Harpone, "these are just the soft, lazy Goldfish. We fished up a few little ones, from the rim of the ocean, next to the ice. The deeper Goldfish, that live far deep down next to the core of Ganymede, those are the hyperkrakens." He clenched a bony fist. "The boss fish, they never saw us sneaking in. They remain blissfully ignorant of human perfidy."

Consilience had emerged from his tank, and was convalescing over a gelatinous sandwich. "They never bite and tear each other," he said, munching, "because they are subtle. They have evolved another method of life, something post-Darwinian. An organic law-and-order. With constitutional rights."

"They have found the proper way to spread throughout a galaxy, while we human astronauts struggle to space-travel in a freakish way," said Audax. "When our Sun blows up, some certain day forward, Earth life will be exterminated. But not them. They'll be blown off within chunks of ice to re-seed themselves in another, distant solar system."

This notion of Audax's soon became quite a stylish concept during the ongoing galactic crisis. The two issues were not equal in merit, of course, because one panspermia was galactic in scale and affected the Earth, while the other panspermia was just an aquarium in a radiation shelter.

Yet they were thematically linked anyway. The three astronauts of Ganymede were the avant garde of this united problem. The life and the storm were aspects of the same forces of Nature. Maybe life itself was a storm of some kind.

Among the bodies of the Solar System, Jupiter had the most powerful gravity, and

the most powerful magnetism. For billions of years, every passing galactic dust cloud had stormed over Jupiter first and worst, like some revolt of dark Titans attempting to unseat the lightning-speared Chief of Olympus.

While three men contemplated a black aquarium, on Earth, thousands of competent scholars dropped everything to confront a menace.

The reality of galactic climate crisis took hold in the minds of mankind. They were able to come to terms with the majesty of it.

In the youth of the Sun—when the baby Sun had been part of a cluster of many other howling, belching sister-stars—the Sun's cradle was inside a galactic cloud-storm.

The Sun itself, and all the Sun's planets, too, had been children of such a cloud. This latest storm cloud was just a modernized version of this primordial cloud. It was the product of a star gone nova, blowing itself to stardust, blasting its planets to shrapnel, and pushing those resultant roiling, twisting, ionized filaments into the general dust-lane structures of the Milky Way Galaxy.

It was just life—life resurgent and dispersed. It was amazing how quickly people got used to this strange understanding, how quickly they stripped the raw wonderment out of it, and invented popular ways to become dismissive, accepting, and urbane.

After all, astrophysicists already knew that galactic climate change happened all the time! It had never happened where normal people might see a million blazing dust-specks streaking through Earth's stratosphere. But it was there.

It was a detonated Solar System spreading itself through galactic space, and since it was so widely spread through so much huge emptiness, the terrible storm was amazingly thin. It was vitally important, but also, it was barely there.

Most of the storm was the off-gassed death-dust of a star, because most of any star system was always mostly the star.

Along with these puffball volumes of star plasma (which were ionized and magnetized, and therefore troublesome in that way), there were other things. Many, many little cinders. Fewer pebbles. Even fewer rocks. Some boulders. Rare, comet-scale icebergs. Some very rare but very real and scary high-speed killer asteroids.

The dead nova had blown up hard enough to knock itself into mist, but any violent explosion, even a starbursts, could never work in a quiet, smooth, uniform way. There would be rubble—rock, ice—where living spores could hibernate for eons.

That was "litho-panspermia." No longer a theory. It was real, like Darwin's Theory was real. "From so simple a beginning endless forms most beautiful and most wonderful," as this navy explorer had once said.

Every litho-panspermia event was also an alien contact. Some volunteered to go and contact aliens (three people), and others confronted a storm cloud of alien spores (six billion people, the current population of the damaged Earth).

Within a few weeks of intense astrophysical study, it became clear that the planet Earth was not in immediate mortal peril. Meteor showers, yes. Radio noise, a great deal. Auroras were bright and plentiful. Peculiar sunspots had appeared.

But the Earthly effects of man-made climate change were much, much worse than galactic climate change. Earth had been through five mass extinctions and was busy with a sixth. Panspermia dust storms seemed to be, if anything, fruitful rather than destructive.

Earth would abide, a living planet in a galactic life-migration, while the astronaut corps was dying. They worked in outer space, but they were never sheltered by Earth's magnetic field and dense atmosphere.

There were about two thousand of these space-miners, and they died much like

miners died in big terrestrial mine disasters. They were not scientists, like the Ganymedean contact teams. They were mere commercial operators. They formed the economic basis of human space exploration (such as that was).

Huge mining-robots did 99 percent of all mining work. The humans mostly worked in space for political reasons, to ensure that other humans (on Earth) would not order the robots to drop large chunks of fatal asteroid onto the Earth.

They used superconductive orbital tethers as astrodynamic whips. It was dreadful to see what the Bubble Storm did to these elegant transport-machines; it was like desert sand through a spider web.

Their machines were dead wreckage, and the humans were decimated and suffering. But they did not despair at heart, and they engaged with the struggle. They abandoned mere business. They led dramatic sorties.

The Tenth Contact team had plenty to contemplate, within their shrinking circumstances.

"I was looking for thrills," said Harpone, "and I found fame. But now I know that I'll never face my fans on Earth. My course of duty is clear. My next adventure is a distant early warning line, the coldest, most faraway outposts of the Solar System. The fortresses of the Oort Cloud."

"I agree with you," said Consilience. "Someone has to find and break the rocks, but that's the battle, that's not the victory. Victory is about logistics and the baggage-train, and that's for me."

"Personally, I'm loyal to the Goldfish," said Audax. "A scientist can't always play the multidisciplinary dilettante. To advance knowledge, you have to commit."

"We committed," said Consilience.

"Yes we did. But what's the nature of life? 'Panspermia,' what is it? It's life inside rocks and under ice in water, that's our galaxy's normal life. We humans evolved on the sunburnt surface of a rock. We have to teach ourselves that we are the freaks, we are the aliens."

When the interplanetary whip-web in orbit about Ganymede came crashing to the surface of that moon, it was clear that the Tenth Contact were doomed. It had been a very good transportation system, clever, ductile, rapid, efficient, discreet, more or less humanly usable, but it had never been designed for galactic catastrophes.

"The thing I like best about this latest insult," said Consilience, stroking his newly grown beard, "is that for years, we tiptoed about, cautious never to disturb the inhabitants of Ganymede. Even our EEL was designed to be silent, discreet. Now a human artifact five hundred kilometers long has crashed down on Ganymede. Now we're marooned, and we've left a huge scar that will last for a billion years."

"We human beings are tragic," agreed Harpone, "and I used to imagine that, if I damaged my private self enough, I might escape that general condition. But now I've seen more of the cosmos. Does the galaxy care if mankind turned an Eden into hell? Hell is the big-time!"

"Now that we're marooned," said Audax, "good sense says that we'll die here. That prospect shouldn't unduly concern us. We human mortals lived for a while, and we contacted alien life. Any other event in our lifespans would be an anticlimax anyway."

The Tenth Contact Mission accepted their doom. For Harpone, Audax, and Consilience, the long months of isolation had made them wary and noncommittal.

Then the Goldfish had arrived in their midst, and the Goldfish were like the fourth member of the crew. The Goldfish were alien life. It was difficult to lose one's temper with these creatures. Even if they violated norms of conventional living behavior—for

instance, exotropically donating more energy than they ever received—how could one blame the gelatinous congelation that was "them," or "it," or possibly "her"?

"We fished them up," said Harpone, "but since we never ate them, and we'll soon be fertilizer, something has to be done."

"We could turn them to fossils and freeze them," said Consilience. "It makes sense, and advances science."

"I don't like the feel of that, it makes my hands dirty," said Harpone. "We're astronauts in an alien world, and they're astronauts pulled from their world, too. But we volunteered for that, and they never did."

"The informed consent of experimental subjects," said Audax.

"That's not what I'm saying. It's like we're a flying saucer—a UFO. Okay, we break some barbed wire, we trespass, we look around. That's trespass; I admit that. But then we abduct a rancher's cow and we kill it. That crosses a different line."

"That's not professional," said Consilience.

"This hyperkraken business," said Harpone, "I never believed the talk there, but now that we got friendly with these things, I think different. If they're there, and we're here, someday they'll know. And what do we tell them? 'First thing we did, we fished you up and we killed you.' "

"The Golden Rule of ethical conduct," said Audax. "We wouldn't want that done to us."

"It seems quite a practical matter to me," said Consilience. "I understand how this Base is maintained, and without supplies, it will surely fail. When this Base breaks like a soap bubble, even our rose garden will freeze solid, but these Ganymede creatures don't have to die with us. If we place them back in Ganymede, that's their home, they're perfectly fine."

"I'm skeptical that we can ship these delicate creatures down seventeen kilometers of EEL pipe with no physical damage," said Audax. "But with that said, we have to write a farewell note to mankind, and I'm keen to write that. To spare our captives in defiance of our own inevitable death, that's a beautiful ethical gesture. We're astronauts! How could we not do that?"

Harpone concurred with the conclusion and sentiments of his partners, and so he left the base with the warm water tank and its cargo of Goldfish and his four icy sleigh-dogs.

"I use to worry that Harpone would die out there," said Consilience, "but now I'm worried that he lives, while we don't. He comes back for a hot meal, and we're popped like a soap bubble. What becomes of the poor fellow? Nothing but art photographs."

Harpone returned alive, but with the Goldfish Bowl empty again, the Ganymede Base was a sepulcher.

Audax, too, the only one not to have left their igloo, had suffered radiation, but refused to enter the sick-tank, because it was a complex device, and therefore misbehaving. "I don't need it," he said. "If it hurts badly enough, I'll just stroll out and become my own monument."

"We can't die with no threat at hand," said Harpone. "We should die facing whatever kills us, because that's how it's bravely done."

"I left my wife and children," said Consilience in the gloom, "as an act of my penance. Because I had failed to do my duty to them—I even deceived and betrayed them. I had hoped they might forgive my infidelities, after three years on some other world. I won't see them, but I'd like them to be proud of their father."

"I myself never admitted to you why I came out here," said Audax. "There are many other scientists more competent than me. Less languid. Less scatterbrained. Less self-involved. Of course, I will be vastly more famous than my colleagues, be-

cause of my fortunate discoveries. And my martyrdom here won't hurt my reputation, because martyrdom is a form of lasting fame that requires no skills."

"It's all right if we don't know how you got there," said Harpone.

"You really don't need to tell us," said Consilience. "You could confess it in your diary."

"My personal story is so complex, though. A story of contemporary science, yet full of palace intrigue. And prurient scandal. There was a woman involved. I swore a gentlemanly silence about her. I swore to her that, if I went to Ganymede, I would never reveal her name, or the tangled nature of our torrid and sordid affair. But now that we're near death, perhaps it's different."

"Nope," said Harpone.

"No difference at all," said Consilience. "A promise of silence is a promise."

It would have taken a miracle to save them.

But sometimes miracles occurred.

A group of miner astronauts had paid with their own lives, in order to snag a chunk of passing galactic rock.

This hurtling meteor was a panspermia sample from a different star.

A Goldfish egg from far away. It was a vivid cluster of faceted jewel-like creatures. They were alive, but they were made of rock and they lived in rock.

Silicon-based life. Nothing like Earth life, nothing like Ganymede life. It was thought to be chemically impossible, until it arrived within a human grasp.

It was not enough to protect the Earth. The Goldfish of Ganymede were also natives of the Solar System. They were like brothers and sisters. They had never needed mere contact, they needed gallant protection.

The Starlife Armada was soon on the way. ❍

Ten Indicators of Time Drift

A Passenger Pigeon returns—to settle
The Permian Mass Extinction—backpedals

Future memories invade—today's dream
Perception's edge fades—to tedium

Your children rapidly accelerate—to adulthood
Your parents physically regress—into childhood

Temporal sinkholes open—embrace key eras
There's no present—to retrace to for us

Historians criticize all fates—all deductive proofs
A time traveler's best lies—all become truths

—Robert Frazier