

IN THE ABYSS OF TIME by STEPHEN BAXTER

Stephen Baxter's fourth Destiny's Children novel, *Resplendent*, will be out soon from Gollancz. It tells the wider story of the Destiny universe, and will include, among others, such Silver Ghost tales from *Asimov's* as "On the Orion Line" (October/November 2000) and "Ghost Wars" (January 2006). The author is currently at work on a new time-paradox series called Time's Tapestry. The first book, *Emperor*, should appear from Ace in January. Stephen certainly plunges us into time's breathtaking depths in his newest tale for *Asimov's*.

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St. John Elstead's cosmological time machine was a hole in the ground.

I was choppered in from L.A. We flew maybe sixty kilometers north, skimmed across the Mojave, and descended close to the town of Edwards. From the air, Elstead's facility was a ring of blocky white buildings that might have spanned a couple of kilometers, set out over the desert. The hub of the facility was a huddle of buildings at the rim of the circle toward the southwest, like a diamond on a wedding ring.

We landed on a helipad, an uncompromising square of black tarmac. I climbed down with my backpack. This was the Mojave, in July. I had flown straight out from a rainy London, and jet lag and furnace heat made me reel.

A gaggle of technicians in orange jumpsuits, some of them carrying lightweight cameras and sound gear, stood at the edge of the pad. A tall, spare figure came striding toward me, smiling. He wore a jumpsuit like the rest, with a nametag on his chest and some kind of mission patch on his arm. His coiffure was expensive, his skin toned, and though I knew he was in his fifties he had the easy physical grace of a man with the time to play squash.

He grabbed my hand. "Ms. Oram. Susie?"

"Yes—"

"Glad you could make it. You know who I am."

What arrogance! But as *Time's* Man of the Year of the previous year, 2023, St. John Elstead, founder and life president of Cristal Industries, was unmistakable. I was tempted to mispronounce his name—"Saint John" rather than the correct "Sin-junn"—but that would have been petty.

He turned on his heel and marched back to his technicians. I hurried to follow, my pack heavy on my sweating back. Over his shoulder he asked me, "Do you know why you're here?"

“Because you’re paying me half a million euros.”

He laughed. “Fair enough. But you don’t know anything else? And it doesn’t bother you?”

I decided to be blunt. “I’m just back from covering the efforts of Christian peacekeepers to broker an armistice in the Iraqi civil war. Writing up some businessman’s latest vanity project does not frighten me, no.”

He glanced at me. “A bit of spirit. That’s what I detected in your work for the *Guardian*.” His accent was the strangulated Bostonian familiar from a hundred ads and a dozen high-profile self-publicizing stunts—ballooning, swimming with the sharks, a circumlunar jaunt on a rented Soyuz. “Full briefing later. But for now, two words: *cosmological exploration*.” He grinned, but it meant nothing to me.

The technicians stood around a hole in the ground. It was maybe a meter across and covered by a heavy metal hatch, like a submarine’s. As we walked up, two heavy-set techs turned the hatch’s wheel and hauled it open. A shaft led into the ground, filled with a silvery light, and I felt an unaccountable thrill.

“Down we go,” Elstead said to me.

“Now? Just like that?”

He shrugged. “We’re ready to go.”

“Go where?”

“We’ve just been waiting for you. There’s nothing to be gained by delaying. And besides, it’s air-conditioned down there. You first. Look, there are rungs inset into the wall of the shaft.”

The shaft was generously wide, plenty of room for me and my pack, and maybe three meters deep. At the bottom I stood with Elstead and looked up at a circle of washed-out Mojave sky, and sweating, silhouetted faces. When the hatch closed over, it was like an eclipse of the sun.

Elstead watched me. “I hope you’re not claustrophobic.”

“It’s just that things are moving a little rapidly.”

“That’s how I like it. This way.”

We were off again. He led me through a door, a big oval metal affair opened by spinning a wheel, then along another short passageway, brightly lit. The air was

fresh and cool, but it smelled faintly metallic; obviously we were in a sealed system. It was like a nuclear bunker. And there were oddities: Velcro pads on the walls, bright color schemes with floors and ceilings clearly distinguished from walls, even doors that looked as if they had been fitted sideways.

We reached a small cabin, and Elstead gave me some privacy for a few minutes. It wasn't much more than a pod-hotel room in Tokyo, but it had a softscreen, its own tiny bathroom facilities, and even a little coffee machine. The bunk had seatbelt-like straps over it, oddly.

A single jumpsuit hung on a peg. It had a nametag stitched onto it—ORAM—and a mission patch, like an astronaut's, which showed a kind of funnel shape like a cartoon black hole, and a slogan: SPACETIME BATHYSCAPHE I. How cheesy, I thought. I did wonder, though, what kind of bathyscaphe could be buried in the Mojave.

I used the facilities quickly, trying to wash off the grit of a transatlantic flight and to wake myself up. The jumpsuit was a perfect fit. I left my London clothes in a locker.

Elstead had waited for me outside. "The suit is OK? It's smart fabric, self-cleaning, temperature control."

It was cool and snug, and moved with me as I walked. "I want one."

He laughed. "Keep it."

Through another hatch in the floor we descended to a lower level, and came to a larger chamber, which Elstead called the bridge. It was a roughly cylindrical space, with its curving walls, floor, and even the ceiling coated with softscreens. Right now these were full of readouts, graphical and digital. Three couches, like heavy-built airline seats with harnesses, were suspended in the center of the room. You reached them by crossing a catwalk of white-painted metal. They had trays laden with more softscreens that you could pull into your lap.

The central couch was already occupied, by a thin, intent-looking man of around forty. He was busy, peering at the wall displays, working at his lap tray. When we walked in, he started to get up, but Elstead waved him back. "That's Teutonic manners for you, but the three of us are going to be working together for the next few days, and I don't think we need stand on ceremony."

The man shook my hand. "My name is Walter Junge." *Vall-tair*. His accent was clipped, precise; I thought he was Prussian.

Elstead clapped him on the shoulder. "Walter is my evil genius—my Igor. All this, the Bathyscaphe and the facility that sustains it, is his design."

Junge nodded. “But your vision, Elstead.”

Elstead laughed. “And my money. Not the first time American money and German know-how have combined to make history, eh, Susie? So our motley crew is assembled. Sit down, Susie—your seat is the right-hand one. Strap in tight.”

The buckles were straightforward. As I strapped in, Junge continued to work, and a low hum filled our spherical chamber. I sensed huge energies gathering. The proceedings had the atmosphere of a space launch; I had a fantasy of this whole facility bursting out of the ground like a Minuteman missile from its silo.

The preparations for this event must have been going on for hours; it was a showman’s touch to have me landed and thrown down here at the crucial moment. It was all as corny as hell, and I still didn’t know what was happening. But again, I couldn’t help feeling thrilled.

Elstead smiled at me. “Susie, a favor. Do you have a pendant? A locket, maybe...”

I had a small crucifix on a gold chain, a gift from my mother when I was five; I’d worn it ever since.

“Would you mind taking it off, and hanging it from your monitor tray?”

I shrugged and complied. The little trinket dangled, glittering in LED light. “I still don’t have the faintest idea what we’re all doing here.”

“You’ll find out in five minutes,” Elstead said.

“Actually a little more than three,” Junge said. “The five-minute count started when you closed the door to the bridge.”

“Three, then. I did give you a clue, Susie—”

“*Cosmological exploration*. That means nothing to me.” I remembered old Discovery Channel shows about giant orbital telescopes peering into space. Cosmology was a matter of observing; its subject was the universe, its theories concerned the ancient past and deep future. How could you *explore* it?

But I had picked up other clues. “We’re in the Mojave. Close to Edwards Air Force Base? A good place to be if you want isolation, but with access to technicians from L.A., and maybe help from the Air Force with heavy lifting.” I thought about that circle of blockhouses, spread over kilometers. “Have you built a particle accelerator out here, Mr. Elstead?”

“Just Elstead, please. Good guess, Susie. But the accelerator is only a means to an end.”

“And I don’t see why you would put a bathyscaphe in the middle of the desert.”

“One minute,” Junge said.

Elstead said, “So why do you think I asked *you* here?”

I shrugged. “With respect, your ego is everything. I’m here as, what, an unbiased witness? My job will be to write up this chapter in your hagiography.”

He laughed, evidently not offended. “I couldn’t have put it better. And, aside from the money, what made you come?”

“If you succeed, fine. If you don’t, this monumental folly will make an even better story.”

“Fair enough. Let’s hope we both get what we want.”

“Fifteen seconds,” Junge said. “Everything is nominal. Ten. Nine...”

“I don’t think we need a count,” Elstead said.

So we sat in silence. Elstead seemed relaxed, unbearably confident. Junge was focused on his machinery, the born technician. Only I grew tense.

There was a kind of jolt. I felt as if I were falling; my chest pushed up against my harness. Startled, I asked, “What is this, some kind of elevator?”

“Look at your pendant,” Elstead said. “Old trick I learned from the Soyuz cosmonauts....”

The crucifix was floating, the chain twisted.

“We’re in free fall,” Elstead said.

“Why? How? We’re buried in the dirt.”

“Not any more,” Junge said. “Elstead, the external monitors are working.”

“Cameras on the outer hull,” Elstead explained to me. “Walter, let’s see out.”

Junge tapped a control. The wall displays cleared of their read-outs, to show what was now beyond the hull of the Bathyscaphe.

Stars.

“We have fallen away from the Earth,” Elstead said, his grin demoniacal in the starlight. “And, far more importantly, Susie, we have fallen into time....”

I screamed. Then I threw up.

* * * *

Elstead and Junge had both been prepared. Elstead had his boy-astronaut experience on the Soyuz, of course, and he had sent poor Junge for flights on a Vomit Comet. For me, spacesickness pills stopped the hurling, but I was fragile for the first hours of our journey—for such I now, tentatively, accepted it to be, though I still didn’t understand where we were going or how we were getting there.

I spent much of that time away from the bridge, exploring the Bathyscaphe. Some kind of displacement activity, no doubt, focusing on the fixtures and fittings rather than what lay beyond the walls. But I did need to learn to get around in free fall.

The core of the Bathyscaphe was a cylinder ten meters tall, maybe five wide. It was divided into three levels. The middle deck was the bridge, centered on our three couches. The upper deck, through which Elstead had led me from the surface, was a living space—cabins, a galley, washrooms. The lower deck was sealed off; it contained computer banks, a closed-system life support, and our power supply, a small nuclear plant. The decks were connected by ladders that were just as easy to navigate without weight. Elstead had borrowed Space Station design elements—the Velcro pads on the walls to which you could stick pens or handhelds, the strong color scheme to give you a sense of orientation.

Our cylindrical hab was contained inside an outer hull, a sphere of hardened steel. The space between the hab and the hull was filled with—well, something strange.

I did try to sleep that night, in my bunk (now I found out what the straps were for). I kept dreaming I was falling, for so I was. I had a fantasy that we were plummeting down some vast shaft into the center of the Earth.

But Junge showed me some of the raw feed from the hull cameras. If he swiveled the viewpoint I could see the curving hull itself, adorned with the Stars and Stripes, and the logos of Elstead’s companies, and bits of Mojave dirt clinging to the metal. And whenever the cameras tipped away from the ship, they filled up with stars.

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Twenty hours after the “launch,” Elstead summoned me by intercom. “We’re approaching our first milestone. You will want to see this.”

Reluctant, fearful, I hauled my way to the bridge. The three couches on their spindly catwalk were suspended in a star field. I pulled myself over the catwalk and strapped myself into my seat. There was no sense of motion, but it made me feel more secure.

It seemed to me that the stars swam, constellations morphing like dreams. And behind the sprinkling of stars was something new, a cloudy veil; I thought I could make out colors, gold and brown. That too shifted, like a cloud seen through raindrops. I had no real understanding of what I saw.

Junge was locked into his machinery, but he was actually more empathetic than Elstead, who wanted only to dazzle and impress me, and he tried to explain. “Everything you see is processed. For one thing the light that falls on the ship’s hull is blueshifted—that is, Doppler-shifted. We have to render the hard rain of photons into something palatable to the eye.”

I knew from speed-trap technology that Doppler shift had something to do with relative velocities. “Blueshifted by what? Are we moving so rapidly?”

“No,” said Elstead smoothly. “The blueshift comes from our falling through time. And our, umm, velocity is increasing. Maybe you can tell that from the way the nearby stars are swimming around the sky. Sol is one of a crowd of stars swarming around the giant black hole at the heart of the galaxy. But beyond you can see another galaxy altogether—Andromeda. Two million light years away, the most distant object you can see with the naked eye. It’s just a faint smudge. In our day.”

The spangled cloud I saw was no faint smudge.

Junge pointed to one star, the brightest. “There is our sun. We haven’t come so far, really.” Again he was trying to orient me, to comfort me. But I thought the sun’s light was red-tinged.

Elstead called, “I guess it’s time you started asking your questions, Susie. The two most basic must be—*how* are we journeying through time, and *why*?”

“Or maybe, *how* are you pulling off this monumental hoax?”

Elstead just laughed. Nothing I said ever seemed to offend him. “Where do you want to start?”

“All right. How?”

Elstead nodded at Junge. “That’s the engineer’s department.”

Junge said, “The details are somewhat intricate. The principle is simple. Buoyancy...”

We delved into particle physics.

The universe is made up of several kinds of stuff. The visible matter, the “baryonic” of which you and I are composed, is a mere trace, far outweighed by “dark matter,” mysterious stuff so evanescent it passes through the light stuff as if it weren’t there, and interacts with it only through gravity. It’s so wispy, in fact, that not a single particle of it was detected until hypersensitive facilities came online in the late 2010s. But both kinds of matter are overwhelmed by a third sort of stuff called “dark energy.”

“Dark energy is a kind of antigravity field,” Elstead said. “It is driving the expansion of the universe. And we know, since 1990s observations of distant supernovae, that about six billion years ago the expansion, having slowed since the Big Bang, began to accelerate. Hence we know the dark energy field is becoming dominant.”

Junge said, “At any moment any volume in the universe—like this ship, Susie, or your own body—contains a mixture of these substances, dark and light matter, dark energy. But as time goes on, the dark energy component increases. And what we have done, with the facility under the Mojave—”

“The particle accelerator.”

“—is to find a way to increase the strength of the dark energy field in a specified volume. Specifically, in the Bathyscaphe’s interhull space.”

“How?” I asked, suspicious. “I thought dark energy is still little understood.”

Elstead said, “You don’t have to understand something to exploit it. My Cristal Industries cellphones work almost entirely on quantum mechanical principles, and nobody understands *that* after a century of trying. But as to the details—commercial confidentiality. Sorry, Susie.”

“And when you’ve flooded the interhull space with dark energy?”

“Buoyancy,” Junge said. “Susie, our Bathyscaphe has been given the fundamental composition of an object from the far future—a time when dark energy will be by far the dominant component of the cosmos. And so the Bathyscaphe, umm, comes untethered in space and time. It’s exactly as a submarine floods its buoyancy tanks to dive. The Bathyscaphe is sinking toward its natural place in spacetime—and that place is the very deep future.”

“But,” I said, half believing, half alarmed, “I suppose we do have a way to blow the tanks.”

“Oh, yes,” Elstead said. He showed me panic buttons, big red slabs mounted on his and Junge’s consoles (though not mine). Pressing these would lift us home immediately. “I have no ambition to die in a spacetime hole.”

“I suppose you have tested all this out?”

“With unmanned drones,” Junge said. “This is the first voyage of the Bathyscaphe itself.”

“Call it a test flight,” Elstead said. “Thrilling, isn’t it?”

Junge was peering at the wall monitors. “The merger is due.”

Elstead checked his lap display. “Right on cue. Susie, perhaps you know that our galaxy and the Andromeda spiral are the two big beasts of our local group of galaxies. And they’ve been heading toward each other since they were formed. Some day in the far future they will collide—but we are *in* the far future, aren’t we? Enjoy the show....”

A band of light cut across the cloudy disc that spanned the sky. I saw sparks: huge stars, forming, blazing and dying. Millions of years passed with each heartbeat.

“We’re sitting in the disc of one galaxy,” Elstead murmured, “as it intersects the disc of another. The loose gas in both galaxies is being compressed to form new stars—it’s the greatest star-birthing event in either galaxy’s history. Tough on any life forms around, however.”

The stars around us swam, agitated, like bees pitched out of a hive. Only Sol burned firm, reddish, immovable; perhaps we orbited it. The delicate structure of Andromeda, only just discernible as a spiral, began to break up. What looked like gas fountained outward, away from me, multi-colored—but that “gas,” brilliantly lit, was made up of stars, clouds and streamers of stars. But the streamers quickly dispersed.

“Show’s already over,” Elstead said. “For a while the collision has created a brilliant, elaborate hybrid. But it is quickly settling down into a huge composite galaxy, a plain elliptical, with the delicate spiral structures of the originals broken up. And most of the star-making gases used up too. An expensive firework display.”

It could have been a simulation. I had sat through much more elaborate VR adventures than this. But still ... “Elstead, when is this collision due to happen?”

“Round numbers?”

“Just tell me.”

“Three billion years after our time.”

I looked for the sun, the one constant in the firmament. But its color had changed, becoming fiery, and I thought I saw a disc. “Is something wrong with the sun?”

“Walter, I thought the red giant phase wasn’t due until six billion years?”

Junge checked figures, and shrugged. “The astrophysicists could only give us predictions. Maybe the galactic collision disrupted solar physics, somehow.”

Elstead snorted. “Bullshit. Make sure you record this, Junge. I’ll enjoy showing this to old MacNerny at Cornell and make that pompous pedant eat his words....”

The sun ballooned, quite suddenly, to become a crimson wall that covered half the sky; black forms like monstrous sunspots crawled across it. Then it popped, flinging out material. For a second the space around us was laced by streamers of glowing gas, green and gold and blue, lit up by the solar remnant. But the nebula dispersed in an eyeblink.

“So that’s that.” Elstead said, matter of fact.

I asked, “What about Earth?”

“If it wasn’t swallowed in the red giant, by now it will be a ball of hardened slag under a thin shell of frozen nitrogen. What do you think of that, Susie? London, New York—and Bethlehem and Mecca—all gone. But our ‘scopes don’t have the resolving power to find it.”

“Three billion years,” I said. “How much further will we go? Ten billion? A hundred?”

“Oh, further than that.” Elstead smiled. I was coming to hate his mind games.

I noticed my gold crucifix still floating in the air. I grabbed it and hung it around my neck. Then I began to unbuckle. “I think I’ll go to my cabin—”

Junge touched my arm. “No. Wait. Brace.”

The ship shuddered, and a cold light flickered behind the stars.

“Gravity waves,” Junge muttered. “The merging of the big black holes from the centers of the two colliding galaxies. Brace for aftershock...”

Again the Bathyscaphe rocked and bucked, its hull metal groaning, as we fell deeper into time.

* * * *

I was on the bridge in the middle of the next day, our third, when we passed the next milestone.

Elstead had served up lunch, in ceramic trays piping-hot from the microwave oven. We ate at our stations with the trays clipped to our laps. My choice was a pasta bake. The galley mostly served up “astronaut food,” as I thought of it, dried food like biscuits, or dinners bound to the plate by glue-like gravies and sauces. I’m told the Russians do it better.

Around us the stars of our new elliptical galaxy swarmed nameless, slowly fading as the eons ticked away.

“Depth, twenty-five billion years,” Junge called. “The Big Crunch. Here we go....”

I was alarmed enough to stop eating. “The Big Crunch—a reverse of the Big Bang, right?”

“Yes,” said Elstead.

“When all matter, all space and time, will be crushed out of existence.”

“Yes.”

“Including us?”

“It’s a possibility—”

Junge held up a hand.

I stopped breathing. I clutched at my couch’s armrests, as if that was going to help.

Nothing happened. The stars continued to shine, fading gently.

“We’re through it,” Junge said. “Next destination the Big Rip, in another fifteen billion years.” He glanced at his timers. “Maybe an hour.” He turned back to his food.

“So no Big Crunch,” I said.

“No Big Crunch,” Elstead said. “And, please note, resident journalist, we have made our first significant cosmological discovery. Susie, I think you need to ask me the second of your big questions.”

I nodded. “*Why*, then? Why make this journey?”

“Simple. To learn the answer to the most fundamental question of all: what is to become of us, in the end?” He began to lecture me, and, through me, posterity. “Susie, when I was a kid the universe looked pretty straightforward. The dominant force was gravity: everybody agreed on that. We knew the universe had come barreling out of the Big Bang, and gravity controlled the future. If the mass density of the universe was too high, if gravity was too strong, then the universe would reach some maximum radius and start to fall back on itself. Otherwise the universe would expand forever. Big Crunch, or endless dissipation. But that simple picture fell apart when those anomalous distant-supernova results turned up in the 1990s. And now the answer to that epochal question about the universe’s ultimate fate depends on the properties of dark energy, which are unknown.

“In the most extreme scenario, suppose the density of the dark energy is decreasing with time. Suppose it even goes negative. If that happens it will become *attractive*, like gravity. The universal expansion will slow quickly, and then reverse. A Big Crunch, soon. But we have already descended through the most likely epoch for a dark energy crunch. In the process we’ve proven something about the properties of the dark energy too, do you see? This is an exploration not just of cosmology but of fundamental physics.”

I glanced uneasily at Junge, who quietly watched his timers. “And the Big Rip?”

This was predicated on a different theoretical model for dark energy, and was still more spectacular. Perhaps the dark energy could become *stronger* with time and the expansion of space—and as it grew stronger it would fuel further expansion—and a positive feedback effect could cut in. The final expansion would be sudden and catastrophic.

“Five minutes to the Rip,” Junge said.

Again I gripped my couch.

“Now you know my objective,” Elstead said. “To observe *directly* our cosmological future—to see which of many possible outcomes we must endure—and thereby, incidentally, to confirm various models of fundamental physics by direct inspection of their far-future consequences. What a goal it is! You

know, I made an awful lot of money through doing awfully little. A slightly different kind of implanted cellphone, just good enough to beat out its competitors: I made billions, but it's an achievement that will be forgotten in a century. *This*, though, will live in the imagination forever. I know people call me grandiose. But I've had my kids, made them all implausibly rich. What else should I spend my money on...?"

And as Elstead talked about himself we lived through the five-minute barrier, and survived a sixth minute, and a seventh. No Big Rip; more dark energy models eliminated.

I went to my cabin, and threw up all I had eaten.

* * * *

The fourth day of our journey was dull by comparison. We sat on the bridge, chewing on half-cooked TV dinners, watching the show.

We were sinking into a deep future of possible cosmic outcomes. We now seemed to be faced by a set of models of the dark energy in which its density remained constant, neither growing nor falling. According to Elstead, all we could do was wait; even at the gathering rate of our descent, there were many slow processes to be worked out before the cosmos came to its next decision point.

Thus we reached a time, a hundred billion years deep, when the cosmic expansion carried other galaxies "beyond our cosmological horizon," as Junge put it, their light no longer able to reach us. Our elliptical galaxy was left alone, hanging in space like a single candle in a cathedral.

It was an increasingly shabby galaxy at that. The galaxies' merger had wasted much of the material needed to make new stars. In time, all that was left was a population of small, miserly stars, eking out their paltry stores of hydrogen. Even they were dying, of course.

I wondered about life. "Civilizations like our own could be rising and falling all around us and we'd never see them." It was true; we rushed by too quickly.

Elstead picked on that. "If there is life out there, do you imagine there could still be people? Even if humanity survives, could our descendants still be anything like us?" He glanced at my crucifix, which floated in the air before my throat. "Are you a practicing Christian, Susie?"

"Sort of." I was brought up Catholic; I attended Mass with my parents. I welcomed the social glue of the Church, and I liked to think I had an open mind about the rest. "You?"

He snorted. "No, but my parents were, as you can tell from my first name.

Consider this. In our day Christianity was only, *only*, a couple of thousands of years old. Some gods have been around longer—but many more have been forgotten. We have no idea to what gods Stonehenge was dedicated, for example. Human culture seems incapable of keeping its gods alive for more than a few millennia.

“But suppose humanity survives a million years—or ten million. Most mammalian species go extinct on such timescales. How will time change mankind? Is it even conceivable that the memory of any god could survive such a stupendous interval? Because that’s what you have to believe, you see, if you follow Christ, or Allah, a One True God.”

I thought about that. “Either possibility—the abandonment of Christianity, or its enduring for a million years—is hard to get my head around.”

“Yes, it is. But go even further. What happens if humanity goes extinct? Could the last man baptize an octopoid creature from Alpha Centauri? Can the flame be kept alive in alien heads? And what happens if intelligence fails altogether? Is there room for Christ in a universe altogether without mind, even without life? Because that is what you *must* believe. Or if you can’t believe it, then what is the purpose of your faith...?”

He went on in this hectoring way for some time. Junge shot me sympathetic glances, but I wasn’t troubled; my residual faith isn’t deep enough for that.

Anyhow I understood that Elstead was just picking on me because he was bored by this long day—bored as he waited for the end of the universe.

* * * *

On the fifth day the stars went out.

For a while the sky was full of their remains. There were black holes and neutron stars, the remnants of giants, while stars like our sun became white dwarfs, slowly fading to black. Occasionally a flare would light up the dark, as an unlucky dead star fell into a black hole, or dwarfs collided and ignited. But these were rare, chance events. Junge said that in the end our sun would collapse to a single, immense crystal of carbon, a diamond cool enough to touch. It was a wonderful image, but we weren’t able to see it.

On the sixth day we watched the galaxy disintegrate. Chance encounters threw one star after another out of the galaxy’s gravity well, a relentless evaporation that turned our black sky even blacker. Junge said that the galaxy was dispersed utterly after some hundred billion *billion* years.

That long day I spent some time trying to make such numbers meaningful to myself. Such was the expansion of scales that as a single year was to the lifetime of

the universe in my day, so that entire epoch from Big Bang to humans was to this new age. But any such comparisons, fleetingly grasped, were soon overwhelmed by our continued plummeting into ever more outlandish depths of time.

And still the expansion continued, still the universe's dreary physical processes unfolded. There was no sound in the Bathyscaphe but our own breathing and the whir of the air scrubbers.

On the seventh day, the ghosts of the last stars, mere infra-red traces, faded out one by one. The cosmic expansion, having long ago separated galaxies from each other, now plunged its hands deep into stellar neighbourhoods. There came a point when the remnant of the sun was left isolated within its cosmological horizon: the sun, alone in its own universe.

And as the day wore on, even the diamond sun began to break up.

Junge had a set of particle detectors mounted on the hull of the Bathyscaphe. He passed their signals through a speaker, and we heard soft pings from the cosmic dark.

“Protons,” Elstead breathed. “The decay of protons into their constituent quarks—on the very longest of terms, even solid matter is unstable. Another theory vindicated! They ought to give me the Nobel Prize for this.”

“So what happens now?”

“That all depends, Susie. On what we find tomorrow.”

None of us went to bed that night. We brought blankets from the cabins and sat in our couches, side by side, the only light in the universe shining on our faces. Nobody slept, I don't think. Yet nobody had the nerve to suggest that we shut off the softscreens and exclude that terrible, unending night. I watched the clock. There wasn't anything else to do.

At last, the eighth day began.

At the time we understood nothing of what happened to us. Later we reconstructed it as best we could.

* * * *

We had clung to each other because we thought we were alone in the universe. We were wrong. Humans had never been alone.

From a hundred centers, life and mind spread across the face of the galaxy. Gaudy empires sprawled; hideous wars were fought; glittering civilizations rose and

fell. Yet what survived each fire was stronger than what had gone before.

Humanity, born early, did not survive to participate in this adventure. But the wreckage of Earth was discovered; humans were remembered.

Then came the collision with Andromeda, a ship of stars carrying its own freight of history and civilization. The vast disruption inflicted deep wounds on two galactic cultures—wounds made worse by the wars of the dark days that followed.

Yet out of these conflicts came a new mixing. Minds rose up from the swarming stars like birds from a shaken tree, and then flocked into a culture stronger and more brilliant than those that had preceded it—but a more sober one.

In the long ages that followed, civilization turned from conquest to consolidation, from acquisition to preservation. Vast libraries were constructed, and knowledge was guarded fiercely.

But the universe wound down.

As the galaxy evaporated, its unified culture disintegrated into fiefdoms. Worse, as the stars receded from each other, the universe shed its complexity, and it became impossible for the ancient catalogues to be maintained. Information was lost, whole histories deleted.

Nobody even noticed when the last traces of humanity were expunged.

The last cultures pooled resources and eventually identities, so that, within the cosmological horizon of the sun, in the end there was only a single consciousness, a single point of awareness, hoarding a meager store of memory.

And still the universe congealed. Elstead's final cosmological discovery was that there could be no relief from the relentless expansion. The proton decay reduced all matter to a cloud of photons, electrons, positrons, and neutrinos—and at last the cosmic expansion would draw apart even these remnants. In the end, each *particle* would be alone within its own cosmological horizon. And at that point, when no complexity of any kind was possible, consciousness would cease at last.

Think of it! There you lie, the last solar mind, trapped in spacetime like a human immersed in thickening ice. Dimly you remember what you once were, how you cupped stars in your hands. Now you can barely move. And the constant expansion of the universe bit by bit shreds your memories, your very identity, a process that can only end in utter oblivion. You have nothing left but resentment and bitterness, and envy for those who went before you.

And yet there is, just occasionally, a moment of relief.

In Earth's oceans, life teemed close to the surface, where green plankton grew thick on sunlight, a minuscule forest that underpinned food chains. But as one fish ate another, scraps or droppings would fall into the deeper dark beneath. Here swam strange fish of the deep, with huge mouths and enlarged eyes and viper-like teeth. There were whole pallid ecologies down here, surviving on the half-digested morsels that rained down from the shell of sunlit richness above.

So it was in the ocean of time. In the bright, energy-rich ages of the past, time travel had been invented and reinvented many times. And wary travelers would venture into the far future, beyond the death of the suns....

You are trapped in the cold and the dark. But, just occasionally, a morsel from the bright warm past falls down the ages to you, bringing with it a freight of mass and energy and, above all, complexity. Just for a while, you can live again—or at least, allow yourself the luxury of completing a thought.

The Bathyscaphe, this unwary time machine, is like a fresh strawberry in the mouth of a starving man. You bite. And yet the taste is bitter....

* * * *

The Bathyscape rolled and shuddered. The walls lit up with red alert signals. Junge and Elstead were shouting at each other. It was far worse than the gravity-wave wash of the galactic collision.

But it wasn't the condition of the ship that concerned me, but the state of my own head.

I could *feel* it in me, another awareness, like a hand rummaging inside my skull. It fed on my memories, my personality, my life—it tried to consume all I had. And at the same time I sensed *it*, a huge intelligence towering over me, a roomy mind like an abandoned museum, and as desolate. I sensed envy. I sensed pity. I sensed *regret*. I wept, for myself, and for it.

And then it backed away. But my head was still cut open, my mind cold and exposed to the air.

I saw Junge's fist slam down on his panic button. Then I blacked out.

* * * *

We sat in blankets under an intense Mojave sun. After the Cristal Industries medics had pulled us from the half-wrecked Bathyscaphe they wanted to move us into a blockhouse hospital, but none of us wanted to leave the light, the warmth. The medics and techs fussed around us, but it was as if only the three of us sat there, still alone in the universe.

Except we hadn't been alone.

All through the eight-day ascent back to the present we had been trying to piece together what had happened, trying to assemble our fragmentary impressions into a coherent whole. We were still arguing.

"It could have destroyed us," Elstead said. "The time shark. But it didn't. Why not?"

"Because it pitied us," I said. "That's all. It consumes time machines. But ours was early—as primitive as a hot-air balloon, perhaps—maybe even the first of all to get so far. It saw something in us it has lost in itself. Potential. Hope, even. It couldn't destroy us, any more than a bitter old man could kill a newborn baby."

"That's quite something," Elstead murmured. "To be the first."

"But *it is us*," Junge said. "It is the confluence of all the minds in two galaxies—or a fragment of that confluence anyhow."

"Not us," I said flatly. "Couldn't you feel it? There was nothing of the human in it, nothing left of us."

We had been arguing about this all the way home. For all he had goaded me about it, Elstead just hadn't wanted to believe humanity had had an end. "Maybe that's so, maybe not." He was as beat-looking as any of us. But, under his blanket, he rubbed his hands. "What we have to do now is make sure it doesn't turn out like that."

Junge and I peered at him. I asked, "What are you talking about?"

"We brought back a hell of a lot of data. Maybe we can figure out what went wrong for humanity. And then make sure it doesn't happen."

I said, "But even if you achieve that—what about the ultimate end? When the expansion scatters the last particles, all complexity is lost—"

"Does it have to turn out that way?" And he began to talk of other theories of physics. The dark energy field could have decreased in strength, just enough to slow the expansion. Or an even more eerie force called quintessence could stop the expansion when the last fundamental particles were still in contact with each other—and life, and consciousness, could continue, though at a terribly slow rate. "But the story wouldn't end," he said. "It wouldn't end."

"Elstead—" After all we had been through I wanted to be gentle. "The universe isn't like that. Cosmology doesn't accord with that model. We saw it for

ourselves.”

He wasn't daunted. “Then we have to find a way to fix it so it *does* accord. Or else ship out to another universe more to our liking. We've plenty of time to figure out the details. It's always been my belief that however the future works out, Big Crunch or Rip or endless expansion, there has to be a way to preserve information through the terminal catastrophe—there has to be a way for life to survive. Anyhow, that's my plan.” He looked at us, his eyes huge in his gaunt face. “Are you with me?”

* * * *

All this was two years ago.

I didn't go back to England. I can no longer bear the dark and the cold—or the ocean. I took a house on a mountaintop in Colorado, a place bathed in light where I could hardly be further from the sea. I'm close enough to the summit that I can walk around it, and, every morning, I do.

I wrote up our story. I earned my euros.

I've found a partner. We're planning kids. That way I can postpone the death of the universe, just a little, I guess. I've kept in touch with Walter Junge; I hope his kids will get on with ours.

I've started attending Mass again. I don't quite know what I'm feeling when I listen to the ancient lessons. But Elstead was surely right that the monumental existence of deep time, and the erasure of all things, is the ultimate challenge to any faith. I suspect that in a few million years we'll be smart enough to figure it out, and I'm content to wait.

As everybody knows, St. John Elstead built a new vessel—Spacetime Bathyscaphe II—bigger and more capable than the first, and stocked it with people of a like mind to himself. I turned down the invitation to join him, but I did send him my crucifix pendant.

Elstead descended once more into the abyss of time, to challenge the destiny he found so unsatisfactory. He has yet to return.

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