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FAR FUTURES

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gone forever. He spoke with the authority of eight hundred more years of science and technological progress.

But—

A tiny seed of doubt sprouted deep in Drake's mind. But what would science say in another two hundred years? In a thousand, or ten thousand? Science had come so far. Surely no one, least of all a scientist, believed that it was now at an end and could go no farther.

Trismon Sorel was talking to him, trying to catch his attention. He forced himself to listen.

"Ana cannot be revived and cured," Sorel was saying, "not in the way that you hoped when you took her body from the cryowombs. But we can help *you*."

"Me?"

"Certainly. We can cure you. There is evidence that a cure was attempted more than two hundred years ago, but it clearly failed. We have superior techniques now that will end your obsession. With your consent, of course."

"Do I have a choice?"

"You have an infinite number of choices. The right to self-determination—even self-destruction, if you wish it—is basic." Trismon Sorel leaned forward. "Now I speak personally. I hope that you will agree to a cure, and enjoy your own new life. I have vast sympathy for you. I have searched the whole data bank as we have been speaking, and your suffering seems unique. No quest comparable to yours can be found."

"I have not suffered." Drake had made up his mind. "And I know what I want."

"State it."

"A cloned form for a new Ana, just as you offered."

"It will be done. And for yourself?"

"I want to remain here just long enough to be sure that the cloning can proceed without problems. Then I wish to leave."

"To go?" Trismon Sorel was bewildered. "But go where? We can offer you everything that your heart desires."

"No. You cannot offer me the Anastasia that I know and love. But that is what I want—all I want. Put me back into the cryowombs, with Ana's original body by my side."

"But I told you, the real Ana, the Ana that you knew, is not in that body. Too many brain cells have been destroyed. Ana is gone."

"She is gone. But gone *where*?"

"That is a meaningless question. It is like asking where the wind goes when it is no longer blowing, or where is the odor of a flower after the flower dies."

"It seems a meaningless question today. But it may not always be meaningless. You told me that I have an infinite number of choices. My choice is simple, and I say it again: I want to be placed in the Pluto cryowombs. Do I have that right?"

"You do." Trismon Sorel could not conceal his discomfort and disappointment. "I cannot deny it to you. But I beg you to reconsider. You can return to cryosleep for as long as you choose, but when will you be awakened? In one century? In five?"

"I do not know. I want to leave this instruction with my freezing: awaken me when new evidence comes into the data banks that seems relevant to the re-creation of Anastasia's original personality. And not until then."

"I must be honest with you. If you hope to sleep until your Ana can return, I believe that you will sleep forever."

"I will take that risk. It is smaller than risks that I have taken in the past. Can we begin?"

"If you insist." Trismon Sorel held up his hand. Drake was already rising from his seat. "But there is one thing more. While we have been speaking, a group-mind meeting has been in progress involving every human within easy signal range. A conclusion has been reached. Your request will be granted, but with one condition: you must have a companion for your travel into the future, just as each of us has a companion."

"I want no woman in the cryowomb with me, other than my own Ana. And no man, either."

"We would condemn neither living man nor living woman to such a future. Your companion will not reside in the cryobanks. It will be a Servitor, designed for on-demand operation, exactly like my own Servitor," Trismon Sorel gestured to the little wheeled sphere with its metal whisk-broom head, waiting quietly at his side. "So long as you do not call upon its services, it will remain dormant. When you need a companion or an assistant, it will be there to obey your commands."

Sorel stood up. "Come with me now. The preparations are already beginning for the cloning of Ana. While that is proceeding, I will introduce you to the endless virtues of the Servitor class. And you can decide on the appearance and name of your own personal model."

Drake woke quickly and easily, rising at once to full consciousness. That was enough to convince him that something had gone wrong. He had not been taken into cryosleep, but instead was awakening as soon as the Asfanil wore off.

He opened his eyes, expecting to see the cryolab facility and Tris-

mon Sorel's familiar face. Instead he found himself lounging at ease in a deep armchair. A woman with the strong features, raven hair, and dark complexion of a gypsy sat opposite. She was watching him closely. When his eyes opened she nodded but did not speak.

"What happened?" His mouth was dry, but no more than usual after sedation. "Why didn't I go into cryosleep?"

"And what makes you think you didn't?" She arched black eyebrows at him. "Don't you believe in progress? The old barbarism of waking agony is long in the past. Today the thawing is no less pleasant than waking from a natural sleep."

She spoke not in Universal but in perfect English, unaccented and without pauses.

He stared around him. His last waking sight had been of the cryolab, deep within the sterile interior of the Moon. Now he was sitting in a room whose long window faced out over a sandy beach and a restless ocean. It was windy outside. He could hear the gusts moaning around the outside of the building, and see tiny sparks of sunlight reflecting from distant whitecaps.

"How long?"

"I was hoping that we might postpone that question for at least a little while." The woman sighed. "I should have known better. All your records display a remarkable focus of attention. To answer your question, it has been rather a long time—much longer than I suspect you hoped. It is more than twenty-nine thousand years since you last descended into cryosleep."

Long enough for real progress in the reconstruction of his Ana.

Longer, also, than the whole of humanity's previous recorded history. Drake stared around him in disbelief. He had again tried to prepare his mind for anything, for any amount of change. And again he was surprised. The last thing that he expected was *sameness*. But the room he was sitting in would not have been out of place as a twentieth-century living room. The scene outside was a pleasant summer's day, something to be found at thousands of locations on Earth's seacoasts.

"It's not real, is it?" He gestured around him. "All this is an electronic simulation, designed to please me." A worse thought struck him. "In fact, I'm not real, either. I've not been revived at all. I've been downloaded."

"Not true." The woman frowned reprovingly. "You were certainly revived, but although the capability exists to do so you have not been downloaded to inorganic storage. You are very real, and you are occupying your own body. However, you are right at least in part. The scene around you was synthesized from your own memories and is being in-

serted for your convenience into your optic nerve—nonintrusively, I might add. The old indignities of body invasion disgust today's society."

"I don't want a synthesis. I want to know where I really am, with my real surroundings."

"Very well. If you insist."

"I do."

"Then there is one other thing that you should know before you leave derived reality." The woman stared at Drake, her dark eyes serious. "You are real flesh and blood. But I am not. I am a part of the synthesis, and I disappear when it does."

She raised her hand in farewell.

"Wait!" Drake, without moving, found himself standing. "I have to know. Has there been progress in bringing back my Ana?"

"I am afraid that there has not. It is still considered to be an impossible problem."

"But I was supposed to remain in the cryowomb until there was hope of a new approach. Why am I awake?"

"I hear the question." The dark head nodded. "However, it is best answered by another. Goodbye, Drake Merlin."

She was gone. With her went the sunlit room and its pleasant prospect of a windswept ocean. Drake found himself recumbent on an adjustable bed with an array of unfamiliar machinery sitting on both sides of him. The room he was in was small and oddly shaped. Its octagonal walls bulged up to a multifaceted convex ceiling. His body felt close to weightless, as though with a tiny effort he would become airborne and float to rest on that pale-blue upper boundary.

Where was he? And who had wakened him?

Drake stared around the room, expecting to see the familiar wheeled form of a Servitor. And then all questions of his location and condition vanished.

A woman waited in the narrow doorway.

It was Ana.

She was standing exactly as he had seen her a thousand times, head to one side and her mouth quirked into a question. Drake tried to stand up and move toward her, but instead found himself rising straight up and turning end over end.

"Easy now." Ana was somehow at his side, steadying him. "I'm sorry, I ought to have waited until you had become accustomed to a low-gee environment."

"The dark-haired woman—the simulation of the woman—it said there had not been progress—"

"It spoke the truth." Ana had floated them back down, to sit side by

side on the bed. "There has been no progress in the problem that interests you."

"But you—you are here, you are alive." A horrible thought struck him: *simulation*. "Aren't you?"

"I certainly am. But it is not the way you think it is." The gentle tone in her voice was infinitely familiar. "Isn't it obvious who I am?"

"You are Ana."

"Yes. But I am not *your* Ana." She took him by the arm, and turned so that they were face-to-face. "I am the Ana to whom you gave life. I am the clone of your wife, the person grown from her cells by Trismon Sorel and his colleagues."

"But the other woman said it had been twenty-nine thousand years—have you been alive for so long?"

"Not continuously. That is not the custom." She laughed, and at the sound Drake felt his heart break. "Like most people, I choose short periods of wakefulness between long ones in hibernation—what you would call cryosleep. Almost everyone is curious to know the future, to meet the future."

"And for twenty-nine thousand years, I have also been curious to meet *you*. Each time I woke, I checked your condition. Each time, before I went again to hibernation, I asked to be awakened should you waken."

"I ought not to be awake now. I was supposed to remain in cryosleep until the restoration of your personality became possible." Except that Drake realized he was delighted to be awake. To be sitting just two feet away from Ana, watching the expressions run across her face—that was infinite bliss.

"I am sorry." She bowed her head. "Forgive me, but that is my fault. I came here to Pluto and countered the instructions given to your Servitor." She frowned. "It says its name is Milton. An odd name for a Servitor."

"Not really." Drake felt a twinge of uneasiness at Ana's comment, which he pushed aside. "Milton is the name that I gave it."

"In any case, I directed that you be reanimated."

"And I'm glad that you did." Drake reached out to embrace her, but she leaned away.

"No. I should have realized that this might happen. Let me try to explain." She stood up and drifted safely out of arm's reach. "You feel that you know me well, and more than well. But I do not know you at all. Although I have gazed at your picture and listened to your voice a thousand times, you are a stranger to me. When I first reached consciousness you were already in the cryowombs. You do not know how much I have

longed to see you, to speak to you, to thank you for giving me life. But in the past I always tried to respect what *you* wanted. I knew that you did not want me."

"I have never wanted anyone but you."

"You want Ana—your Ana. I am Ana, too, but a different person. I have my own memories, my own joys and sorrows. You do not share them." She sighed. "Anyway, a few months ago I agreed to do something that I have been asked to do many times: to go away with friends on a long journey. We will fly out to the human colony on Rigel Calorans. I expect to be away for many thousands of Earth years. When I made that decision to leave the solar system for so long, I wondered: When I return, who knows where Drake Merlin might be? I could not bear the thought that I might never, ever, see and know you. So I gave the command to revivify." She gazed at Drake with the clear grey eyes that he had known forever. "I realize now that this was an unforgivable act."

"You are wrong. It is forgiven already."

"It may be forgiven, but it was unforgivable. It was my plan to leave Pluto soon after speaking with you, and proceed to the edge of the Oort where the expedition will assemble. I can no longer do that."

"Stay with me." Drake did not say it, but his mind added the word *forever*.

"I certainly owe that to you." Ana smiled, with a familiar rueful downturn of one side of her mouth. "And now like the self-serving wretch that I am, I will try to justify my own action. There is some level of temporal shock after any hibernation, even if it is no more than a few hundred years. In your case it has been nearly thirty millennia and you were not prepared for it as we are. So it will be my task to lessen the blow of twenty-nine thousand vanished years." She reached out her hand. "Your Servitor is waiting outside. It is most unhappy that a mere irrational human overrode your explicit instructions to it. Come along with me, and listen to my apologies."

Ana's warning of temporal shock at first seemed greatly overstated. The evidence of human presence on Pluto was mostly the cryowombs, and Drake could see little change to them since his mad dash through and away from them, twenty-nine thousand six hundred years earlier.

The evidence that she was right began to appear as they spiraled in toward the Sun. At Ana's suggestion they planned to visit or pass close by each planet. It was Drake's idea to use a small two-person ship, and leave their Servitors behind on Pluto until they returned.

Neptune had developed in a natural way. There were large colonies of humans and machines on the moons, Triton and Nereid, while the

planet itself formed the home of hundreds of thousands of Von Neumanns, mining volatiles and collecting the rare heavier elements needed for their own reproduction.

But something monstrous was happening to Uranus.

The major moons of the planet, except for little Miranda nearest to the planet, had vanished. The ship swung into coorbit with Miranda and circled Uranus for two full revolutions. The gas-giant world was marked with a pattern of bright spots, ninety-six of them evenly spaced around the flattened sphere of the planet.

"Nothing yet," Ana said in reply to Drake's question. "In another two thousand years or so, when the preparation work is all done, those will be the main nodes. The stimulated fusion program will begin. Uranus is too small to maintain its own fusion, so there will have to be continuous priming and pumping. They'll move Miranda far out, and do it from there."

She spoke casually, as though the conversion of a major component of the solar system from planet to miniature star was a routine operation.

Drake stared out of the ports and wondered. Uranus was not a promising candidate for life, but it would become far less eligible when hydrogen fusion had turned the whole world to incandescence.

The thought nagged at him: Why do such a thing, within the original home system of mankind? Whenever he thought about the far future he imagined Earth, together with all the original planets of the solar system, preserved as some kind of great museum. Humanity might spread out far across the Galaxy, but the home worlds would always be there. They would remind people of their origins.

The Uranus decision made more sense when they had flown past Saturn and its horde of moons, on toward Jupiter, and descended at last for a feathery landing on one of the Jovian satellites. Drake remembered Europa as an ice world, the fifty-kilometer deeps of its continuous ocean plated over by a kilometer and more of icy plateaus and thick-ribbed pressure ridges. But it was that way no longer. Their little ship landed on a giant iceberg, floating in random currents along a broad river. With the sunlight striking in at a low angle, the long stretch of open water seemed mottled and tawny like the skin of a great snake. It wound its way to the horizon between palisades and battlements of blue crystal. As the berg carrying the ship moved sluggishly along, Drake saw open water leads running off in all directions. He shivered. He could imagine strange creatures, huge and misshapen, writhing along the icy horizon.

Europa in its tide-locked orbit turned steadily about Jupiter. The Sun slowly vanished from the black sky. The sounds of jostling floes be-

came louder, carried to the ship through the water and ice of the dark surface. To Drake's musician's ear the bergs cried out to each other, sharp high-pitched whines and portamento moans in frightening counterpoint against a background of deeper grumbles.

"That's why we need the Uranus fusion project," Ana said cheerfully. "Europa is warmed at the moment by individual plants within the deep ocean, and that leads to patchy melting. It will be a lot better here when Uranus is finished and working. The ice will all go, and we'll have another whole world for development."

She was setting out a meal for the two of them, and she obviously did not share one scrap of Drake's uneasiness. But she must somehow have sensed it, because suddenly she stopped what she was doing and came across to his side.

"Are you all right?"

"I'm fine." It was preposterous to be anything other than fine when he was with Ana again, after such a long separation. But maybe it was *because* he was with her that he could admit fears and doubts. In any case, try as he would he could not stop shivering.

"Here." Ana handed him a drink. "I told you there would be temporal shock, and I was right. It just took a little while to show up. You sip on that, while I order something as close as this crazy autochef can manage to the foods you were raised on. And for tonight I think we'll manage with a little less Europa. I'm going to dim the lights and close the ship screens, and you can sit there and imagine you're safely back on good old Earth."

She could not have known it, but long ago, back in the happy days that Drake would not even allow himself to think about, Ana had done just the same thing for him when he was upset. She was strong when he was weak, obligingly weak when he felt strong.

Drake did as he was told. They ate an easy, leisurely meal, talking about nothing or remaining silent, exactly as the mood struck them. The chef provided a reasonable shot at the foods of Old Earth. Afterward Ana cradled his head against her breast, and he hid himself away in the night of her long brown hair.

It was natural, perhaps inevitable, that they would become lovers that evening. Neither of them realized that Drake, deep inside, thought of it as "lovers *again*."

Physical euphoria carried everything before it, all the way into and through the inner solar system. Lovemaking, as it had always been, was an epiphany for Drake. As an antidote to tempora¹ shock it could not

have been better. Immersed in the familiar touch and smell and taste of Ana's soft perfumed skin, he would have seen Earth and Sun destroyed with equanimity.

It was not quite that bad, although four thousand years earlier the Earth had come close to an environmental runaway.

Recovery had been slow. But when the ship landed on the diminished Antarctic ice cap, mean equatorial temperatures were again below 50° Celsius and land animals were venturing sunward from the lush jungles of the once-temperate zones.

Drake felt a brief desire to visit their old home, heat or no heat, until he learned that it now lay beneath fifteen feet of water. In another ten thousand years, according to Ana, the sea level should have dropped enough for him to pay a visit on dry land. She showed no interest in that particular area, or indeed in any location on Earth. He learned that she had been to Earth three times before and found it rather dull.

They took off for space again and wandered on through the inner system. The ship skimmed low across the broad face of the Sun, to show a surface as raging and demonic as anything that Drake had encountered on his visit to Canopus. With Ana at his side, this time he remained unperturbed.

When she declared that they ought to spiral out again toward Pluto, he agreed. If there had been major temporal shock it now lay in the past. He was feeling wonderful, relaxed and content in mind and body as they cruised out to where his Servitor was patiently (or perhaps impatiently) awaiting his return.

Because his guard was down so completely, the shock when it came was so much harder to take.

"What do you mean, make the most of the last few days here?" Drake had been watching the ship's automatic docking on Charon until Ana's words jerked him to attention. "I thought we could stay in the outer system as long as we like."

"We can. You can." She moved to stand in front of him. "But I can't. I made promises, remember. The people heading for Rigel Calorans are waiting for me, but they won't wait forever. I have to head out and join them."

"But what about *us*?" And when Ana shook her head, he went on, "Look, if you already made promises to them, I completely understand. I wouldn't want you to go back on your word. But I have nothing to hold me close to Sol—nothing but you. I'll come with you, join your group."

"No, Drake, you won't. And you do not understand." She took his hand gently in hers. "I like you a lot, and I will never forget that I owe

my life to you. But you can't go with me. Let me put it more brutally: I don't *want* you to go with me. I do not love you as you love your Ana."

"I don't believe it. Everything we've said to each other, everything we've done . . ."

"Everything that *you* have said. We make fine, fond lovers, physically we fit together beautifully, I don't deny it."

"So what's the problem? Ana, we can talk this through, we always have."

"*That's* the problem, right there. I'm not Ana—not *your* Ana. I'm *me*. You and I have never talked through any problems together. Think about it, and you will realize that what I say is true." She released his hand and stepped away. "Drake, this is all my fault. I should never have revived you. I see you looking at me, and I know you are seeing someone else."

"I don't want anyone else. I want you."

"No. You are blind. You want what you see, what you think I am. There's so much background that you and your Ana shared. I don't have that, but you don't even realize it's missing. Let me give you just one example. You assumed I would know why you call your Servitor *Milton*, so you've never bothered to explain to me. But I don't know."

"'They also serve who only stand and wait.' An ancient poet, John Milton, wrote that. It was just a sort of joke when I said it, because the Servitor—"

"Drake, I don't know and I don't *want* to know. I want to leave, right now."

"You can't leave. What will I do without you?"

"You will become what you were before I appeared to mess up your life: strong, determined, brave." She came toward him, hesitated, and then at last kissed him quickly on the lips. "Go forward again, Drake. Don't give up. I agree with you, somewhere, sometime, there will be a way for you to find Anastasia. The real Ana. *Your* Ana."

She stepped away and was out of the door before he could do more than reach out a hand in her direction. He took a couple of steps to follow, then slumped into a chair. He was still sitting there, staring blindly at the rugged surface of Charon, when the door opened again.

The little Servitor, Milton, eased quietly into the room. It rolled forward to stand at Drake's side. As though sensing the human's mood, it did not say a word. It knew what would happen next.

There was the same sunlit room as before, the same outlook onto a sandy beach and windswept ocean. But this time ominous rain clouds

stood in the middle distance; and in place of the raven-haired gypsy woman, a bald-headed man was sitting in the easy chair opposite.

Drake turned his head back and forth. His neck was feeling slightly stiff. "I'd rather you didn't bother with all this, you know. I much prefer the real thing."

"I think not." The man's English was perfect, accent-free. "There have been changes."

"I expect changes. I *need* changes. My era could do nothing to help Ana. Let's dispense with the simulations."

"That is I'm afraid impossible."

"My body—"

"Is fine. You have not been uploaded to the data banks and your cryocorpse, together with Ana's original body, is still safe in a cryowomb. The womb is no longer held on Pluto, for reasons that will become obvious later. However, your body is unchanged and can easily be revived. That may not be necessary, since as you see we no longer find it necessary to reanimate you in order to converse. We are maintaining a direct superconducting link with your brain."

"Who are you?"

"That also is not an easy question." The man smiled, an easy and friendly grin that seemed impossible to simulate. "Call me Alman, if you enjoy a mild joke. Let me just say that I am a composite, and to make you feel easier, I will bring another element of that composite directly to this meeting."

The man did not move, but at his side a familiar sphere topped by a metal whisk-broom blinked into existence.

"With apologies." The Servitor nodded its eyeless head toward Drake. "Your instructions to me upon freezing were quite explicit. However, upon multiple reflection we finally judged it necessary to interface with you. I recognize that an argument could be made that you have not in fact been reanimated, and therefore your instructions have not been disobeyed. However, I reject that as a form of special pleading on my own behalf."

"You are Milton? You don't sound at all as you used to."

"I am Milton, and in composition more than Milton. But I am still your Servitor."

"How long?" Drake sat up straight, aware that his real body deep in cryosleep could not move a micrometer. "How long since I went back to the cryowomb?"

There was a perceptible hesitation before Milton answered. "By your standards, it has been a long time. There have been . . . discontinuities . . . in solar-system development."

"You mean a total collapse of human civilization? I worried about that, before I first went into cryosleep."

"There was no collapse in the sense that you imply, with loss of technology. However, on three occasions human development has proceeded in other directions—what we now perceive to have been false directions. During two of those periods, the whole idea of technology lacked meaning."

"How long since I went to the cryowomb? Are you going to tell me, or aren't you? Forget the 'temporal shock' nonsense and tell me. That is a direct command."

"Even without reinforcement from the composite, I am empowered to reject any command contrary to your well-being. However, I will answer. Your body has been within the cryowomb for a period which, in your most familiar units of Earth orbital revolutions, is fourteen million years." The Servitor paused. When Drake did not move, it continued: "Fourteen million years. Which is to say, a period equal to—"

"I know what fourteen million years is." Drake laughed, a harsh humorless bark of disbelief. "I guess I was wrong. I'm not immune to temporal shock at all. I'm *in* temporal shock, right now. Give me a minute or two, Milton, then I'll be fine."

"As long as you need." The Servitor rolled backward a few feet, and the bald-headed man in the armchair continued, "We assume that you refer to subjective minutes. One advantage of a superconducting interface is speed. This meeting is taking place with subjective time lapse equal to less than one thousandth real-time—"

"I need to *know*," Drake interrupted. "I need to know what's happened to the solar system—why you woke me—if there has been progress with Ana's problem." He had a thrilling thought. "Is it possible to interface with her brain, the way you did with mine?"

"Unfortunately, it is not. We made contact, long ago. But too many of her brain cells have been destroyed."

"Let me try for myself." Drake found he was trembling with eagerness. "Put me in touch with her, let me make my own evaluation."

"We judge that would be most unwise." Alman's face was compassionate. "For your sake. Just as it is unwise to expose you to humankind as it exists today. We have no wish to add to your level of uneasiness. If it is any comfort, your strength and mental resilience are extraordinary. We feared that you might retreat to insanity immediately after being contacted. You did not. But contact with the sad, muddled remnant of mind that sits now within Anastasia's body would try your sanity past bearing."

"But has there been other progress? If her brain cannot be repaired—"

"We will come to the question of scientific progress in due course. For the moment, we judge it best for you to begin with the most familiar. Your Servitor will show you around the solar system. Then it will be time for us to talk again."

Drake was not interested in a stupid tour of the solar system. He wanted to know what changes might affect Ana's possible return. He leaned forward, ready to dispute their proposed approach.

And found that he would be given no chance to do so. With one final wave of his hand, Alman vanished.

Although Drake's frozen body remained in the cryowomb, the illusion that he had been reanimated was perfect. He felt that he and Milton were traveling together in a real ship, its motion and progress constrained by the limits of physics and geometry. He experienced real hunger and fatigue. After sixteen hours of subjective wakefulness, he would begin to yawn and feel the need for sleep.

It was the solar system that seemed to lack reality.

They began close to the Sun, where the familiar, steady beacon offered constancy and comfort. A few million years were nothing within the lifetime of a G-class star. It had looked down on Drake's birth, and he expected it would look down unchanged on his death.

But unlike his birth, that death could not take place on Earth. Drake had stared from the ship's ports in awe as they swept out past the hot cinder of Mercury and on to the garden world of Venus, with its blue-white atmosphere, placid seas and sculpted contents. The transformation of that planet was surprising and wonderful. But most of his interest was already focused ahead. Earth. What would the home world have become, after such long habitation and development?

As they drew closer he looked and looked again. The Earth-Moon doublet was growing in the ship's displays, familiar yet oddly wrong. The proportions were right, Earth's disk bulking more than ten times as big as its satellite's; but the colors were strange. The smaller world was an angry red tinged with yellow smears. The larger gleamed white, a dull and almost uniform white, oddly suggestive.

He stared hard at that pale orb, and felt a perspective shift suddenly within his mind.

"That's the Moon! Which means that the *little* one has to be Earth. Is this all just a simulation?"

He hardly expected an answer. Although Milton was at his side, the Servitor had spoken little since the journey began.

This time, however, the response was immediate. "It is no simulation. Although our journey is in derived reality, what you are seeing exactly matches the physical world."

"What happened to the Earth?"

"It is easier to say *why* than *what*. As we told you, three times while you were in cryosleep a strange direction was taken by humanity. In two of those, technology was ignored. In the third, it took a leap which even now we do not understand. The center of that new technology was Earth. One day, without warning, Earth collapsed to a fraction of its old size. Its surface closed. Its mass remained unchanged."

"It collapsed while it was still inhabited? What happened to the people?"

"We do not know, but we believe that in some form they survived. Even after six hundred thousand Earth years, no one has ever managed to penetrate the sphere that you see. It remains impermeable to all forms of matter and radiation. Our best theory is that the sphere is constantly maintained by a single entity within it, a combination of organic and inorganic intelligence.

"Of perhaps greater consequence to the rest of the solar system, at the time of its collapse and closure the Earth was the repository of all major data banks. Their loss had a profound effect on human development—even on human sanity. Everyone was suddenly deprived of a vital group memory and cohesive force. The process of reconstruction began, but it was slow, uncertain, and imperfect. In that era, every person in the cryowombs was revived to assist in the re-re-creation of old historical records. You alone, because I was armed with your specific instructions, were exempt."

Drake leaned back, his thoughts bitter and far from the Earth that now filled the screens. So all the long shots had paid off after all; even the "useless" ones whom no one had previously thought it worthwhile to revive. Instead of fleeing from Pluto he should simply have placed himself with Ana in the Pluto cryowomb. They would have been awakened together, to live the rest of their lives together.

"Do you wish to go closer, for sentimental reasons?" Milton was at his side, the Servitor's wiry broom of sensors turned toward him. "It is deemed quite safe to do so. There has never been interference with an approaching ship, not even ones that land upon the outer surface of Earth."

"That isn't Earth, no matter what you call it." Drake turned his back on the displays. "Take me away. There's nothing for me here."

Nothing for him, perhaps, anywhere in the whole solar system. That defeatist thought grew stronger as they flew on outward from the Sun. It

was not a problem of mere physical change—the rings of Saturn gone into the terraforming of Titan, Uranus like a miniature second sun illuminating the outer planets, Pluto basking in new heat to the point where nitrogen was a liquid on its surface and the cryowomb containing Drake and Ana had been moved to a more convenient and cooler location.

More important than all those were the changes that could not be seen. When Drake first heard the words “fourteen million years” he had at once realized some of the implications. The recent news that everyone else in the cryowombs had been revived strengthened his understanding that he was now what he had once feared he might become: a living fossil, a creature from the remote past. Even the cryowombs themselves were an anachronism, replaced as a method of hibernation by the far easier and more reliable uploading and downloading of minds to and from electronic storage. Drake owed his own and Ana’s continued existence in cryform only to Milton’s literal and conscientious mind.

And it *was* a mind. He could no longer think of the Servitor as a simple mechanical aide. Considered alone, Milton possessed powers that rivaled those of any single human from Drake’s time; considered as part of a composite, the Servitor far surpassed that.

The familiar constellations had left the sky, replaced by new and anonymous patterns. Fourteen million years was long enough for the slow movement of the “fixed” stars to have changed totally the face of the heavens. On the long flight out to the edge of the Oort Cloud (a dizzying coalescence, now, of a hundred million worldlets and interlocking intelligences) Drake struggled to accept his new reality. He had been told by the composite, of which Milton formed one unit, that the science of today was not merely unknown to him, it was *unknowable*. Although science was not the reason that he had been contacted within the cryowomb, there had indeed been progress in the problem of restoring the original Ana. Unfortunately, that progress was in terms strange to Drake. It had been explained five times by Milton. Still, Drake wondered if his misconceptions exceeded his understanding.

He tried once more, as their simulated journey through the new solar system neared its end and Alman appeared unexpectedly on board the ship.

Drake cornered the bald-headed man in the galley, aware even as he did so how ridiculous his own action must seem. Since everything was in derived reality, Alman could choose to vanish as easily and suddenly as he had arrived.

“Milton says that new developments have made it possible in princi-

ple to restore Ana in her original form—not merely her body, but her whole personality.”

“No.” Alman sighed, a wholly plausible human sigh. “That is not what we said. We said that because of changes in our overall understanding of the universe, it *will be* possible in principle to restore Ana in the future. It is a statement of theoretical interest. It is not possible today.”

“Then, *when* will it be possible? And what has changed, to make it possible?”

“It is not easy to explain in a way that you will understand. Or to know where to begin, so as to maximize the probability of your comprehension. Perhaps we should start with a question: Do you know the difference between an open universe and a closed universe?”

“No idea.”

“I feared as much. And yet the distinction is easy to define. You know that the more distant galaxies are receding from us?”

“Sure. Even in my time most people knew *that*.”

“Then the definitions become very simple. In an *open* universe, the galaxies will go on receding from each other forever. In a *closed* universe, they will one day reverse their outward motion and begin to approach each other. In a closed universe, the end point for that approach is a final collapse to a point of infinite density, pressure, and temperature. Is that clear?”

“Clear, and totally irrelevant. I’m interested in restoring Ana, not in learning cosmology.”

“That is understood. Permit me to proceed. Whether or not the universe is open or closed depends on the overall density of matter within it. If that density is too low, the universe must be open. If it is high enough, past a critical value, the universe must be closed. What I say next will seem very difficult to you, and we are not sure that you can ever understand it fully; but the possibility of restoring Ana—your original Anna—depends on whether the universe is open or closed. Hence it depends on the density of matter, or more strictly speaking on the mass-energy density, of the universe.”

“You are quite right, I don’t understand. But if I did, so what? Either the universe is open, or it is closed.” Drake could not conceal his impatience. Once again he became aware that he did not fit well into the present. He was too focused and direct, an atavism in the more polished and diplomatic society that Alman represented. He did not know what the changed physical form of humanity looked like, but his guess was that nails and teeth had gone. He alone possessed his residual claws and fangs.

"Have patience." Alman effortlessly read Drake's anger and impatience. "If your original training had perhaps been in mathematics and physics, rather than in music . . ." The implied criticism was left hanging in the air, as Alman continued, "Certain other things become possible in a closed universe. Such a universe possesses a single, final end point. And at that *eschaton*, that ultimate stage of confluence of all things, the universe itself contracts toward a single point. All timelike and lightlike curves converge there, and everything meets. This was known to scientists and philosophers, even at the time of your own birth. It was sometimes termed the *Omega Point*. Just before the *eschaton* is reached, all that has ever been known, all information past or present, becomes accessible. Every item of information about people who died a thousand years ago—or fourteen million years ago—becomes available. At the *eschaton*, every personality that ever existed could in principle be re-created, in perfect detail."

"Including Ana! I understand, I understand exactly."

But Drake was filled with rage, not exhilaration. "If this was known millions of years ago, why the devil was it never once mentioned to me?"

"Because it seemed totally irrelevant. The potential for such future action exists only if the universe is *closed*. In your time, the observations of mass-energy density provided too low a value, by a factor of ten to twenty. That indicated an open universe. Later, scientists decided on theoretical grounds that the universe ought to sit exactly on the boundary between an open and a closed universe. They sought experimental evidence for the missing matter, and they slowly found it. There was still uncertainty; however, they thought that the universe would expand forever, but more and more slowly. In such a case the *Omega Point* would never exist.

"But that has at last changed. For reasons that we still do not understand, recent measurements reveal a higher mass-energy density beyond the critical value. That points to a closed universe. The *eschaton* will exist. One day it must be reached."

"And Ana can then return to me. When? When will it happen?"

"In the far, far future. After a time so long that it makes the interval from your first moment of cryosleep to the present day seem less than the blink of an eye. We recommend that you do not even consider such a forward journey. Still less should you attempt it. But your own wishes are important. We seek to know what you want."

"You're crazy!" Drake glared at Alman in disbelief. "You don't know what I want? Why do you think I was frozen in the first place? I want to be with Ana. I'll wait forever if I have to. I don't care how long I have to stay in the cryowomb."

"We feared such a response. We deem it irrational. However, we sense your resolution and the force of your will."

"Good. Then get out of my mind. Let me sleep in the cryowomb until I can *do* something."

"That is not an option." Alman shook his head. Inexplicably, he vanished and Milton at once appeared in his place.

"Other factors must be considered," said the Servitor. "Your preservation and protection is my prime responsibility. That is why I, with some difficulty, overrode your own command within me and disturbed your cryosleep. The cryowomb will not be adequate for your future needs."

"It did fine so far."

"For an interval of only a few million years, yes. At the temperature of liquid helium all biological processes are imperceptible to normal observation. But random thermal motions still exist. A few atoms occasionally gather enough energy to induce state transitions, and those can lead to biological changes. Small changes, admittedly; but mind and memory are very delicate things." The Servitor paused. "Why are you smiling?"

"You sound just like the head of the Second Chance team, arguing long ago for liquid helium over liquid nitrogen. I thought liquid helium was the coldest you could go in practice."

"By no means. Do you think there has been no scientific progress in nine million years?"

"You still sound familiar. I had the same thought myself, long, long ago. So why not keep the cryowomb at a lower temperature?"

"No matter how cold, there would still be occasional random effects. Alteration could still happen. However, there is another way, and a better way."

"Persuade me." Drake thought he knew what was coming.

"Uploading. The conversion of the complete contents of your brain to electronic storage. Even though such storage is not immune to random statistical effects, those can be eliminated using redundancy and error-checking codes. I will vouch for their efficiency—personally."

"How do you know that you don't change? You could be different than you were yesterday."

"And you may not be the Drake Merlin who went into cryosleep, or the same person who met with Trismon Sorel. I can say only this: uploading represents your best chance of remaining unchanged into the far future. It would be painless, and you would be quite unaware that it was happening."

"I'm not worried by pain. There are worse things in the world than pain. What are you leaving out? You sound uncomfortable."

“Possibly.” The Servitor hesitated. “I must inform you of one other factor, which we feel is irrelevant but which may appear relevant to you: it is not feasible to upload the complete Ana. Her full genome is already in electronic storage, so future cloning is trivial. But her brain can offer no more than a random chaos of disconnected elements. Their transference would be pointless.”

“If I move, Ana moves as well.”

“That is really quite unnecessary. If her personality can ever be restored, the existence of primitive brain residues will not be a factor.”

“So you say—now. But I’ve heard too often that nothing can be done for Ana. Move us both, or neither one of us.”

“We hear you.”

Milton vanished, but Alman at once popped back into existence in his place. “If you insist, we will agree. But there is one other thing to discuss before uploading begins. Once you have been uploaded, it offers great advantages to become part of a composite—a shared mind, large or small. Will you consent to such a merger?”

The decisions so far had been easy. Now Drake had to think. The pluses were obvious: access to a near-infinite array of facts; a better understanding of the new world he had moved into; probably a better ability to comprehend the arcane but important statements that Alman had made about the eschaton and the far future.

But were there also negatives, so well hidden that the composite represented by Alman was not even aware of them?

Drake could sense one, a subtlety that was hard to define precisely. There was a *softness* to this age, a willingness to bend and compromise and take direction. That sounded like real progress for the human species (if that name still applied). But as part of the composite, he would surely find his own anachronistic claws and fangs vanishing, dissolved by the soft pacifism of the group mind. And what was good for today might prove fatal tomorrow. Might there still be a future when polish and diplomacy were useless, where what was needed to restore Ana was raw resolve and crude energy?

It was a risk too big to take. “I don’t want to become part of a composite. I’d like to be uploaded and placed dormant in the database. And I’d like to be activated only if there is significant new information about the Omega Point, useful in Ana’s restoration.”

He had said what he wanted to say, yet it felt incomplete. He knew that he owed a personal debt: to this epoch, to his faithful Servitor, to the people who had finally offered him a distant hope that he might succeed.

“But if you have problems—tough problems, ones that I might be able to help with—then you have my permission to bring me from dormancy and add me to a composite. I haven’t had an idea in fourteen million years, but who knows? Maybe I’ll get lucky and think of one.”

There are worse things in the world than pain.

It was true. Pain can be channeled and concentrated, marshaled and molded, directed to draw some element of the world into bright particular focus. Harsher pain only leads to tighter focus.

But panic, heart-stilling, gut-twisting panic, has no redeeming value. It dissipates rather than distilling. When blind panic roars and surges, all sensibilities are driven out and all concentration vanishes.

Drake awoke to that knowledge. Terror and horror howled from every direction. He could not learn the cause. He found he was blind to everything, deaf to all but the screaming of minds. He tried to order the chaos around him and structure the questions that must be asked: *What is the source of fear? How long has it been present? How far in the future have I come? Why was I not made aware of the problem earlier, before it became urgent?*

It was impossible. The questions formed, and a hundred billion replies came raging in at once. They said everything and nothing, individual vectors combining to give a null resultant.

Drake made a supreme effort. He ignored the torrent of inputs from the countless billions of minds accessible to his, and looked inward to create his own environment.

A familiar room, windowed and comfortable. A prospect beyond it of a windswept, sunlit ocean.

And in the seat opposite, ready to answer his questions—

He recoiled. Instinctively he had thought of Ana, and she sat waiting. But it was the worst choice of all. In Ana’s presence he would dream away the time.

Who?

People flickered into the armchair and were as quickly gone. Alman, Trismon Sorel, Milton, Par Leon, Cass Leemu . . .

Tom Lambert. The figure of the doctor stayed and steadied. He shook his head reprovingly at Drake. “Dumb, very dumb. Not your fault, of course, but the composite’s. They should have known better.”

“Better than what?” Drake saw that it was Tom at thirty, leaner and younger than the paunchy version of their last meeting.

“Better than to wait until the problem was so urgent, before calling you to consciousness and asking you to deal with a full composite. They

should have insisted that you go through practice sessions long ago, as soon as you were uploaded, so you would know how to structure and sort inputs in a hurry when you needed to.”

“I managed.”

“It’s more than they deserved.” Tom leaned back, pipe and lighted match in hand. He was still in his tobacco-smoking days, shortly before sinus problems had made him give up smoking completely. “Well, let’s get down to business. Some of the questions that you asked are pretty damned hard to answer, you know.”

“Like what? I thought they were very basic.”

“Well, you asked about time again, how many years it is past your upload into the data banks. You know very well that with people buzzing all over the galaxy, or sitting in really strong gravitational fields, everyone’s clock runs at a different rate. They use a completely different technique for describing time now, and if I told you how it worked it wouldn’t mean a thing to you. Why don’t we just agree that however you measure it, it’s been a very long time compared with your previous dormancies.”

“Agreed for the moment. I want to come back to it later.” *A very long time*—compared with fourteen million years? Drake suspected he would not like the answer, even if it could be put into his old-fashioned terms. “Tell me first about the problem. I asked to be activated if you were close to knowing how to bring Ana back to me, or if you had a big problem. Don’t bother telling me which one it is—I already know.”

“Sorry about that. But it is a problem, the very devil of a problem, nothing to do with Ana. We are beyond desperation. To be honest with you, you are our last hope, and a long shot at that. *A damned* long shot. We need a new thought. Or maybe an old thought.” Tom’s mouth trembled, and the fingers holding his pipe writhed. On the fringes of his mind Drake heard again the faint cry and yammer of countless terrified minds. He ruthlessly suppressed them, building a gate in his own consciousness that admitted only the calmer components.

“Thanks. That’s a lot better.” Tom took the pipe from his mouth and laid it down on the broad windowsill. “Might be a good thing if I show you directly, don’t you think, and let you see for yourself? You know the old advice: Don’t *tell, show.*”

“Go ahead.”

“We’ll begin with the solar system. Hold onto your hat, Drake. And *hey presto.*” Tom clapped his hands. The inside lights turned off. The scene beyond the picture window changed. Suddenly it was dark outside, with no hint of sea or sky. The room hovered on the edge of a bleak and endless void, lit only by glittering stars.

As Drake stared, the scene outside began to move smoothly to the right, as though the whole room was turning in space. A huge globe came into view. It was bloated and orange-red, its glowing surface mottled with darker spots.

“The Sun?” Drake knew the answer even before he asked the question. If he was within the solar system, this had to be Sol. But Sol transformed by time, from the warm G-2 dwarf star that he had known into a brooding stranger. “What happened to the planets? I don’t see them.”

“Not enough natural reflected light. But I can highlight them.” As Tom spoke, bright sparks appeared to one side of the Sun. “That’s Jupiter, and that’s Saturn.”

“And Earth?”

Tom shook his head. “Sol has advanced along the main sequence to its red-giant phase. It’s a hundred times its old size, two thousand times the luminosity. If Earth had remained in its original orbit it would have been incinerated, just like Venus. Mercury was swallowed up completely. Don’t worry about Earth, it still exists. But it . . . moved. Far away. No point in looking for it. Sol isn’t even visible from Earth’s present location. If you like I can show you the Moon, that was left behind.”

Far away. How far away? Would a human (if there was still such a thing) see today, looking upward from the surface of that distant Earth?

“*I had a dream which was not all a dream.*” Drake muttered the old words as they welled up in his mind. “*The bright Sun was extinguished, and the stars did wander darkling in the eternal space, rayless, and pathless; and the icy Earth swung blind and blackening in the moonless air.*”

“Sorry?” Tom’s voice was puzzled. “I don’t quite grasp what you’re getting at.”

“Not my thoughts. Those of a writer dead long before I was born. Don’t worry about me. Keep going.”

“Right. I wanted to start close to home, give you a local perspective, then move out bit by bit. Here we go again.”

Sol was shrinking, as the room that Drake sat in backed away into space and lifted high above the ecliptic. The planets of the outer solar system appeared briefly in the plane below as highlighted points. Neptune was there. Pluto had vanished. Uranus, its fusion fires long stilled, formed an invisible cinder no bigger than a Jovian moon.

And the motion was continuing. In another minute the inner edge of the diffuse globe of the Oort Cloud became visible, billions of separate and faint points of light smeared by distance into a glowing haze. “Every one highlighted for the display, naturally,” Tom said casually. “Not much sunlight this far out. And of course we’re showing just the inhabited bodies. What you might call the ‘old’ solar system colonies, before

the spread outward really began. Wanted you to see that, but now if you don't mind we're going to pick up the pace a bit. Can't afford to take all day."

The outward movement accelerated, accompanied by Tom Lambert's offhand commentary. The whole Oort Cloud was seen briefly, then shrank rapidly with distance from huge globe to small disk to tiny point of light. Other stars with inhabited planets, or planet-sized free space habitats, appeared as fiery sparks of blue-white. The whole spiral arm came into view. It was filled with occupied worlds. The interarm gaps showed no more than a sparse scattering of points, but across those gulfs the Sagittarius and Perseus arms were as densely populated as the local Orion arm. Finally the whole disk of the Galaxy was visible in the field of view. Blue-white sparks extended from the dense galactic center to its wispy outer fringes.

The display froze at last.

"That's the way it stood," Tom said. "It was like that until just one-tenth of a galactic revolution ago. Development, by organic, inorganic, and composite forms, had been steady and peaceful through twelve complete revolutions of the Galaxy. But not any more. Now I must show you a recent time evolution—in terms familiar to you, I will display what has been happening in the past few hundred millions of Earth years."

There was a tremor in his voice, a new hint of uncounted minds quivering beyond the gate and walls imposed by Drake. The static view outside the picture window slowly began to change.

At first it was no more than a hint of asymmetry in the great pattern of spirals, one side of the Galaxy perhaps showing a shade less full than the other. After a few moments the differences became more pronounced and more specific. A dark sector was appearing on one side of the disk, the blue-white points within it quenched by its touch. Drake thought at first of an eclipse, as though some unimaginably big and dark sphere was occulting the whole galactic plane. Then he realized that the analogy was wrong. The blackness at the edge of the Galaxy was not of constant diameter. It was increasing in size, as though something was moving in to invade the galactic disk and growing constantly as it did so.

"As it is today." The display froze and the lights came on again within the room, as Tom continued, "Except that it has not ended. The change continues, faster than ever."

A great crescent wedge had been carved from the display, cutting out almost a quarter of the whole disk.

"The colonies vanish, without a signal." Tom sounded bewildered. "If all the composites in the vanished zone have indeed been destroyed,

billions of sentient beings are dying from moment to moment while we are speaking."

"What have you tried?" Drake had his own idea as to what was happening. It was obvious to anyone from his era.

"We have tried many things. We have sent signals in that direction. There has been no reply. We have sent inorganic probes. We have sent ships bearing individual organic units. We have sent ships carrying full composites. Not one of any type has ever returned."

"Were your ships armed?"

"Armed?" The puzzled reply was that of a society which billions of years ago had found aggressive impulses an impediment to progress. There had never been a need for them in the steady and peaceful spread across the Galaxy.

"Armed with *weapons*, Tom. Able to defend themselves if they were attacked."

Tom Lambert's image flickered and wavered, as though whatever was communicating with Drake had suffered a temporary breakdown. Terror bled in from the host of clamoring minds in the background.

"They had no weapons." Tom was steadying again. "There are no 'weapons.' Even that concept has been relegated to remote third-level storage within the data banks. What are you suggesting?"

"Something very simple. This galaxy is being invaded, by something from outside."

"But what?"

"I have no idea. Whatever it is, intelligent or nonintelligent, it is deadly. Even if it doesn't *mean* to do it, it's doing it anyway. It's killing you. You have to be able to defend yourself against its effects."

"We have no idea how to do that."

"I can tell you." To Drake it was the ultimate irony. That he, a dedicated pacifist in his own time, with a hatred so strong of all things connected with warfare that he would not even compose military music on generous commission, should after uncounted eons emerge as weapons adviser to the whole Galaxy . . .

"I have no idea what science and technology is available to you, and I doubt if I could ever understand it. But I don't need to. I'm going to tell you what weapons *do*. And I'll warn you now, you won't like what you hear any more than I like telling it to you. For a start, let's talk about what self-defense means. After that I'm afraid we'll have to start to get nasty."

• • •

It came as a surprise, although it should not have.

Drake was working with beings (with or without their inorganic helpers, he was less and less inclined to label them as “humans”) who could turn on and off the light of stars, harness black holes for energy sources, and build space colonies the size of planets. In some way totally mysterious to him they had even managed to bypass the light-speed limit for solid inanimate matter, creating odd space-time singularities known as *caesuras* to send objects at high speed to the most remote regions of the universe.

For the composites, once the necessity had been accepted it was easy to produce devices of bewildering destructive power. The caesura singularities, employed as weapons, had the potential to throw structures completely out of known space-time. Drake saw the method demonstrated on whole uninhabited planets. They vanished without a trace. He did not understand the explanation that the bodies were appearing in some other universe, but he felt a strong foreboding of guilt. Without his guidance, these engines of destruction would not exist.

Once they did, the second and more difficult phase had to begin: someone must be willing to use them. It became more and more clear that he alone could be that someone.

There were other problems. Drake had originally assumed that Tom Lambert’s reluctance to discuss the passage of time was a deliberate desire to conceal information. Now he realized that he was dealing with beings who would without hesitation agree to spend fifty thousand years in a dormant and uploaded condition during a slow-speed trip across the Galaxy, often subject to considerable time dilation, then follow it by a period in which their electronic forms operated at a rate millions of times faster than that of organic components. In that environment, absolute time had little relevance to anything.

But the consequence of that loss of time-sense had profound effects on what Drake was beginning to perceive as the “battle to save the Galaxy.” A ship, armed with its newly developed weapons, would set off for one of the “danger zones” where colonies were winking out of existence. Whether it succeeded or failed, news might not be returned to the Sol center of operations for more than fifty thousand years. It was also not at all clear what those ships were doing, if and when they encountered the unknown hidden force whom Drake saw as Shiva, the impersonal and ultimate Destroyer. No one had the slightest idea when to run or when to stay, when to defend and when to attack.

Drake chafed at the lack of feedback, even as he resented his own role as military commander. Finally, and reluctantly, he accepted the only logical answer. He must force himself to accept a unique and wor-

rying fate. He would be multiply downloaded, so that Drake Merlin—or a Drake Merlin—could be sent out to advise and direct on every ship.

Some of them, he knew with absolute certainty, would “die” when the ship that bore them was annihilated by the Shiva. The other copies of him might learn of that death, but they would know it only abstractly.

Would he then be alive, or would he be dead?

Like many of the questions he had asked himself recently, it seemed to have no meaning. He decided that abundant duplication offered at best a prospect of unasked-for immortality, which for him had little personal appeal.

As the ship came closer Drake Merlin looked out onto a barbecued world, a shrunken planet covered with a crisp black coating. He gave instructions to send those images back toward Sol. Moments after he realized that for some reason the outgoing signals were being inhibited, the ship that was carrying him flamed to incandescent atoms.

Drake Merlin was traveling in the second of two ships, following at a safe distance behind the leader. They were in constant communication. No matter what happened, the trailing ship would return across the Galaxy with full information.

The ship ahead moved peacefully on, heading for a star at the very edge of the danger zone. Without warning, fire blossomed around it. It was gone, without a hint of an outgoing signal to say what had happened.

The second ship turned at once. It was not quick enough. As the same fire moved to engulf them, Drake realized that he had answered at least two questions: Whoever and whatever was invading the Galaxy had to be sentient. And the Shiva were malevolent. There was no other explanation for a trap set to catch more than one ship.

The pity was that no one but he would ever know what he had learned.

It was information of sorts. Where a giant space colony had once floated in free space, the sensors now showed nothing at all. However, the nearest star, no more than a light-hour away, revealed subtle changes in its spectrum. There were more metal absorption lines than had been shown in the old records.

Drake pondered strategy as the lead ship turned cautiously toward the star. He had been downloaded to both ships, and his two electronic versions had worried the problem all the way out from the galactic center. Something new was needed. Ship combinations had been sent out before, without success.

When the first ship was within ten light-minutes of the star, the second one released a tiny pod. It lacked a propulsion system, but contained miniature sensors, an uploaded copy of Drake, and a low-rate transmitter.

He hung silent and motionless in space, and watched the approach to the star of the two ships. The first one vanished in a haze of high-energy particles and radiation. The second turned to flee, but a rolling torus of fire arrowed to it from the place where the other ship had been destroyed.

Drake reached a conclusion: the radio link was an Achilles' heel. The second ship should have been at a safe distance, but after the Shiva had killed the first ship they had been able to follow the tiny pulses of communication between the two.

It was the first meager shred of direct information about the Shiva that anyone had ever obtained. It told him that he had to be ultra-cautious in his own transmission. He began to send data out, warily and slowly, varying the strength and direction of the signal. Thousands of receiving stations, all over the Galaxy, would each receive a disconnected nugget of information. When he was finished someone else would face the task of time-ordering the sequence of weak signals, allowing for light-speed travel times, and collating everything to a single message.

Drake sent the pulses out a thousand times, varying the order of the signal destinations. By the time he was finished three thousand years had passed and he had drifted far from the star where his ships had died.

He had no propulsion system. Even now, he dared not risk a rescue signal.

They also serve who only stand and wait.

He waited. For another one hundred and forty thousand interminable years, he waited. The pod contained minimal computing facilities and no other distractions. There was absolutely nothing for him to do.

At last he gave the internal command to turn off all systems within the pod. And in doing so, erased himself.

If Drake had known what was involved, he wondered if he would ever have begun. He examined the large-scale map, and shuddered at what he saw. The region where human colonies were unaffected now formed no more than a thin crescent on the outer edge of the whole galactic disk. The rest, including the dense center, had been eaten away by the Shiva.

And still he had no idea of their motives. Every attempt at communication with them had failed.

But data about the Shiva had been trickling in over the eons, miserably slowly and in tiny fragments. Their vulnerability was at last becoming clear to him. You did not need to know *why* a flame burned, in order to extinguish it.

If you were also convinced that the flame was alive and intelligent, however, you did need resolve. And the Shiva were certainly intelligent. That presented Drake with a terrible problem. Even as they died, the endless trillions of units and composites working with him shrank from the idea of killing any Shiva. It had to be he, in his uncounted downloaded versions, who must unleash the lightning.

He was also forced to make sacrifices, creating tactical hecatombs that he dared mention to no one. His allies, every one of them, would try to stop him if they ever learned what he was doing. As he baited his traps with whole stellar systems, he knew that when those traps closed he would be a murderer on a scale never seen before in the whole Galaxy. He was incinerating billions, hoping to save trillions.

And he finally forced himself to face another unpleasant reality: if all the Shiva in the Galaxy were destroyed, the task would still not be at an end. It was clear from the manner of the Shiva's appearance on the galactic rim that they had come from *outside*. They could return at any time unless they were tracked down and eradicated at their original source. Before Drake's work was complete, humans and their inorganic allies would need to pursue the Shiva, perhaps all the way to the edge of the universe.

Drake sighed, and gave the command to send out another fifty million ships. Each one carried a new and more sensitive set of detectors for Shiva presence; each one bore the caesura generators, weapons that made the first ones he had used seem like a child's cap gun.

Each one guaranteed that two hundred billion more sentient beings, Shiva or human, would die.

The fight had gone on forever. This was not the end, nor even the beginning of the end; but it might be the end of the beginning.

Drake looked at the display, and saw that for the first time in eons the crescent of human control was no longer shrinking. Considered over a span of hundreds of millions of years, a slow oscillation of the boundary could be detected. The Shiva were advancing in places, but in others they were being pushed back or annihilated, star by bloody star. The idea of human survival—even of human victory—could be entertained as a possibility.

And with that possible success came a new problem, of a completely unexpected kind.

Throughout the endless years of the battle, Drake had remained aloof. He would not allow himself to become part of any composite, organic and inorganic, within the interconnected webs of consciousness. Nor would he share his personal data banks with anyone or anything. His logic was simple and invincible: he alone was willing to make the awful decisions of death and destruction needed to defeat the Shiva. He dared not risk any dilution of that will.

For what seemed like forever, versions of his individual self carrying that lonely resolve had been downloaded and sent out on the warships, to meet their fiery or frigid end at the edge of the Galaxy and beyond.

With the Shiva ascendant it had been a one-way process. But now in some of the spiral arms, humans were beginning to hold their own. As they began their own programs of attack and pursuit into the space between the galaxies, and then on through other galaxies, some of the ships were actually surviving.

And some were coming back. On board each of them was Drake Merlin; each one different, each with his own unique experiences, yet each undeniably Drake.

He had held himself apart from all others. But how could he refuse access to himself?

He could not. Drake at last entered a composite. It was, however, a unique composite in which some version of Drake Merlin formed each component.

At first it was total chaos. His element selves numbered in the endless billions; he had long ago lost count of the number of times he had been downloaded, and the total constantly increased. Parts of him were close by, parts were separated from the rest by millions of light-years; some had been partly destroyed in combat, and had become maimed or incomplete versions of a whole Drake Merlin. All, without exception, were now *different*. Time and events had produced changes in form, perspective, even in self-image. Drake struggled to understand, to assimilate, to integrate, and to maintain or create a single personality among that teeming horde of selves.

Through it all, the battle with the Shiva continued. Humans were at last winning. The need for direct oversight by Drake diminished. As the threat of the Shiva receded and the need for his continuous involvement grew less, Drake became increasingly consumed by introspection. He took less and less interest in any external event, unless it was directly relevant to a substantial fraction of his own components.

However, those components were linked to other composites and to other data banks. They stretched out across the galactic clusters and the great rifts toward the edges of the accessible universe, and they told of

an evolving and changing cosmos. The dust clouds had been consumed, the supergiant stars long ago exploded to supernovas or collapsed to black holes. Even main sequence stars like Sol were far along in their lifetimes, reduced from their bloated red-giant stage to tiny white dwarfs no bigger than the original Earth. It made little practical difference to Drake Merlin or the other composites; intelligence had long ago migrated to other dwarf stars, only a tenth of Sol's mass. As available energy was reduced, thought and information collection was forced to operate at a reduced rate; but it went on. The slow-burning small red stars provided only a niggardly dribble of radiation, but their energy supply would be sufficient to permit mentation to continue for at least another hundred billion years.

Except that it would not continue. It came as a shock to Drake when the news drifted into his network that the universe itself had passed a critical point. Remote galaxies, always showing a red shift in the past, now showed a slight blue shift. The microwave background radiation, almost infinitely diluted and cooled by the expansion of the universe, revealed a tiny increase in black body temperature.

The Great Expansion was over. The long fall toward the final singularity of the Big Crunch was beginning.

The news stirred within Drake a strange uneasiness. It brought back memories, so far removed in time that they carried no physical impressions. He had to sift, deep within his own oldest data banks, before he found them. Old information concerning the difference between an open and a closed universe had at last become of significance. As information on that subject flooded in, with it also came a searing guilt.

He had forgotten his own most solemn vow.

It was easy to offer justification for his oversight. He had been preoccupied with a battle for human survival, the greatest war in the history of the universe. There had been no time for any other focus. And after the struggle with the Shiva had reached the point where other composites could begin to handle it, Drake had faced what was in many ways an even more difficult task: the integration of his own diverse and dispersed self to a single personality.

He could offer justifications for forgetting his vow; but he could not accept them. He owed to Ana what he had promised her so long ago: her original personality, as he had known and loved it during the only important years of his life, the short but precious years of their marriage.

Somewhere, somehow, he had lost sight of the prime objective. Now it returned, stronger than ever.

A closed universe. Why had that thought been the key to memories of Ana?

By force of circumstance, many of Drake's components had spent unnumbered millennia studying the technology of weapons developed for the battle against the Shiva. With that study had come an understanding of the science that lay behind the weapons. What had been so obscure to Drake in the distant past now appeared obvious to his extended being.

In a closed universe, a final point of collapse lay at the end of time. The *eschaton*, the *Omega Point*, the space-time *c-boundary*—in his own original era it had been given a variety of names, and its main properties had been defined. From his point of view, two of those properties now were paramount. First, as the universe came close to its final convergence the density of mass-energy would increase dramatically and so would the overall temperature, heading for a singularity of infinite heat and pressure; second, and more important for Drake's purpose, close to the *c-boundary* all information—everything that ever could be known—would become accessible. Everything that ever could be known; and everything that *had ever been known*.

It was what he had been told, long ago. But now he understood in detail what had before been a vague general concept. If he could survive far enough into the future, and gather and absorb enough information there, a time would come near the end when the accumulation would be sufficient. At that time Ana, the true Ana whom he had known and loved, could by his own efforts be restored to him.

He knew it was infinitely desirable. It even seemed possible in principle. But was it possible in practice?

Drake at this point was far from omniscient. He did not know the answer to his own question. Worse than that, his knowledge of the nature of the *c-boundary* did not offer any idea as to how to begin.

All he could do was collect information and try to keep intact his myriad components. As time went on that became harder. The universe was shrinking. Contact between far-separated elements was easier, and the need for long-term electronic hibernation lessened—but that merely made more important every difference of component outlook and background. Soon he was scrambling, working nonstop to hold a single point of view and a single goal.

Meanwhile, the collection of information could not stop. Drake slaved on, endlessly collecting, collating, comparing, sorting, and merging, while the sky became brighter and the more distant sources of light glowed steadily bluer. Constantly, he was forced to download more copies of himself to deal with increased volumes of data. The number of his components grew steadily. Contact with some of them, entering from far across the sweep of galaxies, was baffling. He had already been

forced to deal with and try to understand the Shiva as part of his information gathering. Now he found some components of his own self no less alien. The effort of assimilation became greater and greater.

The cosmos shrank faster, imploding toward the final singularity. The sky had become one violent actinic glare when Drake became aware of a new presence, a strangely different voice rising to speak from among his endless sea of selves.

It emerged from the white noise that formed the edge of Drake's consciousness and steadily approached his central nexus. And as it neared it seemed to touch and merge with each one of his components. Even before direct contact was possible, he sensed who it might be. The thought spread through all of his extended self and resonated there in wild surmise.

"Ana!"

"Who else?"

"But where did you come from? Can you be real? I mean, to just appear . . ."

"We've really got to stop meeting like this, eh? I think I'm real." The cosmos filled with quiet laughter. "I think therefore I am. I think I'm me, Drake, I really do. But you know the theory as well as I do; as the universe converges towards the *c-boundary*, there's no limit to what you can know about anything. So it's not beyond question that I am just your simulation, a construct of your mind. *You think, therefore I am.*"

"You are not a simulation." Drake suddenly hated his own suggestion that Ana might not be real. "You can't be. Don't you think I would know it if I was creating a simulation?"

"You might. But maybe other powers come with knowledge. I'll answer your question with another: Is self-deception possible, even for an omniscient being?"

"I don't know. All I can say is it doesn't *matter*. When you are with me, nothing else is important."

"All right, let's avoid an argument by agreeing that I'm here and I'm real. So before I do anything else, let me say thank you. Now I have another question. How much time do we have?"

She had always been the practical one, the clear-eyed realist, raising issues that Drake was happy to push under the rug. And as usual she was asking the right question.

Drake looked beyond himself, to the universe that he had been ignoring. It blazed with energy. The cosmic background had become almost as bright as the stars around which the quadrillions of composites clustered. And still the pace of collapse was accelerating, rushing giddily on to the final singularity.

"A few more years of proper time, at most, then we'll hit the c-boundary." He found it impossible to worry. Ana was with him, never again would she leave him.

"Is that all?" The visual construct that she had chosen was frowning. "Just a few years? I mean, it's more than I ever expected, but it's not much of a return on investment for *you*, after all your efforts."

"It's enough. We'll stretch it subjectively. We can run in electronic mode and stay out of hibernation."

"I still don't like it." She was inside his mind, gently feeling her way around. It was the delicious touch of knowing fingers, exploring his most private regions. "A few years isn't nearly enough time to get to know each other again. Don't you think you ought to *do* something about it?"

"Ana, you're talking about the end of the universe." Drake laughed, still delirious with his own happiness. He could feel music welling up inside him, for the first time in eons. "It's the end of everything. The Omega Point. That's all she wrote."

"I remember a different Drake. It was you, wasn't it, who once had a quite different opinion?"

Drake knew it was no question. She was teasing him. Ana was well aware who had thought what. And she must have been happily plundering his data banks of memories for longer than he had been aware of her presence, because he had never spoken aloud the words that she said next. "*Science has come so far. Surely no one believes that it can go no farther.* Remember that?"

"That was when there was time, what seemed like an infinite amount of it. Now there's no time. Not for new science, not for anything but us."

"Once you knew next to nothing, Drake, and you were able to work a miracle. Now that you have all the information in the cosmos available to you, who knows what you'll be able to do. The universe is ending because it's closed, right? So *open it*. The knowledge you need already exists. We just have to look."

Ana picked him up and carried him with her. He found himself cascading through space in all directions at once, while ghostly data banks swirled to him and through him, an accumulation of knowledge unimaginable at any earlier epoch. He recognized within them a million bare possibilities; but they were no more than that.

"We can't avoid the eschaton, Ana. It's there. It's a feature of our universe."

"I thought the eschaton only existed in a closed universe."

"It does. If the mass-energy density had been below the critical value, this universe would be open. But the density is too big."

"So. Reduce it."

"That's impossible." Except that before the thought was complete, Drake had seen the way to do it. The caesuras, created so long ago in the battle with a mortal enemy, sat as scattered and forgotten relics across the whole of space-time. Once they had served to eject the Shiva completely from the universe. They could provide a similar function again, for any amount of mass and energy.

She was inside his mind, and she had caught the idea as it came into being. "Well, Drake. What are you waiting for?"

He could not speak at once. He was engaged on a dizzying involution of calculation, every one of his selves operating at its limit. The answer, when he had it, was not one that he wanted her to hear.

"It's still no, Ana. We can dump enough mass-energy into the caesuras to form an open universe. But we would have to go far beyond that to do any good. We need enough structural bounce-back to avoid a final singularity here."

"So that's what we do. You say the caesuras can handle any amount of energy and mass."

"They can." The dreadful irony of the situation was revealing itself to Drake. "But there's one insoluble problem. Information is equivalent to energy. And I—with all my selves and all my extensions and all my composites—represent enough energy equivalence to make the bounce-back impossible. It's the ultimate catch: Any universe that I am in must be closed."

"You mean with the physical laws that apply in *this* universe. What about other universes, the ones that form the end point for caesura transfer? Look at those, Drake."

He was already looking. There was speculation in the data banks, but no solid information.

"Ana, it's still no. Even if we had all the information possible in this universe, it would not be enough to tell us what lies in other universes. There's no way to find out."

"Not true. There's one very good way. We go and see. Come on."

Suddenly they were hurtling through space, faster and faster. Dangerously fast. Relativistically fast. At this speed, a few subjective minutes brought them months closer to the eschaton. The little time they had together was melting away. Drake coordinated his countless selves. All would have to fly, exactly in unison, into the myriad caesura that gaped black against the cosmic background.

At the edge of the caesura horizon, he slowed and hesitated. Mass and energy was swirling past them into the infinite maws, draining from the universe. But as long as he remained here, the final singularity could not be avoided.

"Second thoughts?" Ana was tugging at him, urging him on toward blackness. "Bit late for those."

"Not second thoughts. I was thinking, it would be just our luck to emerge into some place where the laws of physics are too different to permit life—or be thrown to a universe that's full of the Shiva."

"You worry too much." She was bubbling within his mind, an effervescence that he could never resist. "*Life is a glorious adventure, or it is nothing.* You were the one who first quoted that to me. Have you changed so much?"

"I don't know. I can't bear to lose you again."

"You won't lose me." She was reaching out, enfolding him, confident as he was nervous. "Wherever we go, we go together. You'll have me for as long as there is time. Come on, Drake. You always said you wanted to live dangerously, now's your chance."

They were on the brink of the spiraling funnel, close to the point of no return. Ana was laughing again, like a child in a fairground. "Here we go," she said, "into the Tunnel of Love. And don't forget now, make a wish."

"I already did." It was too late to turn back. Ahead lay total, final darkness. Behind them he imagined the radiance dimming, easing with their departure away from the hellfire of ultimate convergence. The universe they were leaving would become open, facing an infinite future. Not bad, for a man and woman who only wanted each other and had no desire to change anything. "I wished that—"

"Don't tell me, love—or it won't come true!"

"Won't matter if I do tell." They were passing through, heading for the unknown, the last question, birth canal or final extinction. Was it imagination, or did the faintest glimmer of light shine in the vortex ahead?

Drake reached out to embrace Ana, squeezing her as hard as she was holding him. "Won't matter if I do, love. Because it already has."