

GLACIAL

New writer Alastair Reynolds is a frequent contributor to *Interzone* and has also sold to *Asimov's Science Fiction*, *Spectrum SF*, and elsewhere. His first novel, *Revelation Space*, was widely hailed as one of the major SF books of the year. His most recent novel is a sequel to *Revelation Space* also attracting much notice, *Chasm City*. Upcoming is another big new novel, *Redemption Ark*. His stories have appeared in our Fifteenth, Seventeenth, and Eighteenth Annual Collections. A professional scientist with a Ph.D. in astronomy, he comes from Wales, but lives in the Netherlands, where he works for the European Space Agency.

In the taut and absorbing story that follows, he takes us to the arid and frozen wastelands of a distant alien planet, where one man must solve an intricate and puzzling mystery before the clock runs out -- and his own life runs out with it.

NEVIL CLAVAIN PICKED his way across a mosaic of shattered ice. The field stretched away in all directions, gouged by sleek-sided crevasses. They had mapped the largest cracks before landing, but he was still wary of surprises; his breath caught every time his booted foot cracked through a layer of ice. He was aware of how dangerous it would be to wander from the red path that his implants were painting across the glacier field.

He only had to remind himself what had happened to Martin Setterholm.

They had found his body a month ago, shortly after their arrival on the planet. It had been near the main American base; a stroll from the perimeter of the huge, deserted complex of stilted domes and ice-walled caverns. Clavain's friends had found dozens of dead within the buildings, and most of them had been easily identified against the lists of base personnel that the expedition had pieced together. But Clavain had been troubled by the gaps and had wondered if any further dead might be found in the surrounding ice fields. He had explored the warrens of the base until he found an airlock which had never been closed, and though snowfalls had long since obliterated any footprints, there was little doubt in which direction a wanderer would have set off.

Long before the base had vanished over the horizon, Clavain had run into the edge of a deep, wide crevasse. And there at the bottom -- just visible if he leaned close to the edge -- was a man's outstretched arm and hand. Clavain had gone back to the others and had them return with a winch to lower him into the depths, descending thirty or forty meters into a cathedral of stained and sculpted ice. The body had come into view: a figure in an old-fashioned atmospheric survival suit. The man's legs were bent in a horrible way, like those of a strangely articulated alien. Clavain knew it was a man because the fall had jolted his helmet from its neck-ring; the corpse's well-preserved face was pressed halfway into a pillow of ice. The helmet had ended up a few meters away.

No one died instantly on Diadem. The air was breathable for short periods, and the man had clearly had time to ponder his predicament. Even in his confused state of mind he must have known that he was going to die.

"Martin Setterholm," Clavain had said aloud, picking up the helmet and reading the nameplate on the crown. He felt sorry for him but could not deny himself the small satisfaction of accounting for another of the dead. Setterholm had been among the missing, and though he had waited the better part of a century for it, he would at least receive a proper funeral now.

There was something else, but Clavain very nearly missed it. Setterholm had lived long enough to scratch out a message in the ice. Sheltered at the base of the glacier, the marks he had gouged were still legible. Three letters, it seemed to Clavain: an I, a V, and an F.

I-V-F.

The message meant nothing to Clavain, and even a deep search of the Conjoiner collective memory threw up only a handful of vaguely plausible candidates. The least ridiculous was *in vitro fertilization*, but even that seemed to have no immediate connection with Setterholm. But then

again, he had been a biologist, according to the base records. Did the message spell out the chilling truth about what had happened to the colony on Diadem: a biology lab experiment that had gone terribly wrong? Something to do with the worms, perhaps?

But after a while, overwhelmed by the sheer number of dead, Clavain had allowed the exact details of Setterholm's death to slip from his mind. He was hardly unique anyway: just one more example of the way most of them had died; not by suicide or violence but through carelessness, recklessness, or just plain stupidity. Basic safety procedures -- like not wandering into a crevasse zone without the right equipment -- had been forgotten or ignored. Machines had been used improperly. Drugs had been administered incorrectly. Sometimes the victim had taken only themselves to the grave, but in other cases the death toll had been much higher. And it had all happened so swiftly.

Galiana talked about it as if it were some kind of psychosis, while the other Conjoiners speculated about some kind of emergent neural condition, buried in the gene pool of the entire colony, lurking for years until it was activated by an environmental trigger.

Clavain, while not discounting his friends' theories, could not help but think of the worms. They were everywhere, after all, and the Americans had certainly been interested in them -- Setterholm especially. Clavain himself had pressed his faceplate against the ice and seen that the worms reached down to the depth where the man had died. Their fine burrowing trails scratched into the vertical ice walls like the branchings of a river delta; the dark nodes of breeding tangled at the intersections of the larger tunnels. The tiny black worms had infested the glacier completely, and this would only be one distinct colony out of the millions that existed all over Diadem's frozen regions. The worm biomass in this one colony must have been several dozen tons at the very least. Had the Americans' studies of the worms unleashed something which shattered the mind, turning them all into stumbling fools?

He sensed Galiana's quiet presence at the back of his thoughts, where she had not been a moment earlier.

"Nevil," she said. "We're ready to leave again."

"You're done with the ruin already?"

"It isn't very interesting -- just a few equipment shacks. There are still some remains to the north we have to look over, and it'd be good to get there before nightfall."

"But I've only been gone half an hour or --"

"Two hours, Nevil."

He checked his wrist display unbelievably, but Galiana was right: he had been out alone on the glacier for all that time. Time away from the others always seemed to fly by, like sleep to an exhausted man. Perhaps the analogy was accurate, at that: sleep was when the mammalian brain took a rest from the business of processing the external universe, allowing the accumulated experience of the day to filter down into long-term memory: collating useful memories and discarding what did not need to be remembered. And for Clavain -- who still needed normal sleep -- these periods away from the others were when his mind took a rest from the business of engaging in frantic neural communion with the other Conjoiners. He could almost feel his neurones breathing a vast collective groan of relief, now that all they had to do was process the thoughts of a single mind.

Two hours was nowhere near enough.

"I'll be back shortly," Clavain said. "I just want to pick up some more worm samples, then I'll be on my way."

"You've picked up hundreds of the damned things already, Nevil, and they're all the same, give or take a few trivial differences."

"I know. But it can't hurt to indulge an old man's irrational fancies, can it?"

As if to justify himself, he knelt down and began scooping surface ice into a small sample container. The leech-sized worms riddled the ice so thoroughly that he was bound to have picked up a few individuals in this sample, even though he would not know for sure until he got back to the

shuttle's lab. If he were lucky, the sample might even hold a breeding tangle; a knot of several dozen worms engaged in a slow, complicated orgy of cannibalism and sex. There, he would complete the same comprehensive scans he had run on all the other worms he had picked up, trying to guess just why the Americans had devoted so much effort to studying them. And doubtless he would get exactly the same results he had found previously. The worms never changed; there was no astonishing mutation buried in every hundredth or even thousandth specimen, no stunning biochemical trickery going on inside them. They secreted a few simple enzymes and they ate pollen grains and ice-bound algae and they wriggled their way through cracks in the ice, and when they met other worms they obeyed the brainless rules of life, death, and procreation.

That was all they did.

Galiana, in other words, was right: the worms had simply become an excuse for him to spend time away from the rest of the Conjoiners. Before any of them had left Earth's solar system, Clavain had been a soldier, fighting on the side of the faction that directly opposed Galiana's experiments in mind-augmentation. He had fought against her Conjoiners on Mars and she had taken him prisoner at the height of the war. Later -- when he was older and an uneasy truce looked like it was on the point of collapsing -- Clavain had gone back to Mars with the intention of reasoning with Galiana. It was during that peace mission that he realised -- for the sake of his conscience -- that he had to defect and fight alongside his old enemy, even though that meant accepting Galiana's machines into his head.

Later, along with Galiana, Felka, and their allies, Clavain had escaped from the system in a prototype starship, the *Sandra Voi*. Clavain's old side had done their best to stop the ship from leaving, but they had failed, and the *Sandra Voi* had safely reached interstellar space. Galiana's intention had been to explore a number of solar systems within a dozen or so light years of Earth until she found a world that her party could colonize without the risk of persecution.

Diadem had been their first port of call.

A month ago, at the beginning of the expedition, it had been much easier to justify these excursions. Even some of the true Conjoiners had been drawn by a primal human urge to walk out into the wilderness, surrounding themselves with kilometers of beautifully tinted, elegantly fractured, unthinking ice. It was good to be somewhere quiet and pristine, after the war-torn solar system that they had left behind.

Diadem was an Earthlike planet orbiting the star Ross 248. It had oceans, icecaps, plate tectonics, and signs of reasonably advanced multicellular life. Plants had already invaded Diadem's land, and some animals -- the equivalents of arthropods, mollusks, and worms -- had begun to follow in their wake. The largest land-based animals were still small by terrestrial standards, since nothing in the oceans had yet evolved an internal skeleton. There was nothing that showed any signs of intelligence, but that was only a minor disappointment. It would still take a lifetime's study just to explore the fantastic array of body plans, metabolisms, and survival strategies that Diadem life had blindly evolved.

Yet even before Galiana had sent down the first survey shuttles, a shattering truth had become apparent.

Someone had reached Diadem before them.

The signs were unmistakable: glints of refined metal on the surface, picked out by radar. Upon inspection from orbit they turned out to be ruined structures and equipment, obviously of human origin.

"It's not possible," Clavain had said. "We're the first. We have to be the first. No one else has ever built anything like the *Sandra Voi*; nothing capable of traveling this far."

"Somewhere in there," Galiana had answered, "I think there might be a mistaken assumption, don't you?"

Meekly, Clavain had nodded.

Now -- later still than he had promised -- Clavain made his way back to the waiting shuttle. The red carpet of safety led straight to the access ramp beneath the craft's belly. He climbed up and stepped through the transparent membrane that spanned the entrance door, most of his suit slithering away on contact with the membrane. By the time he was inside the ship he wore only a lightweight breather mask and a few communication devices. He could have survived outside naked for many minutes -- Diadem's atmosphere now had enough oxygen to support humans -- but Galiana refused to allow any intermingling of microorganisms.

He returned the equipment to a storage locker, placed the worm sample in a refrigeration rack, and clothed himself in a paper-thin black tunic and trousers before moving into the aft compartment where Galiana was waiting.

She and Felka were sitting facing each other across the blank-walled, austere furnished room. They were staring into the space between them without quite meeting each other's eyes. They looked like a mother and daughter locked in argumentative stalemate, but Clavain knew better.

He issued the mental command, well-rehearsed now, which opened his mind to communion with the others. It was like opening a tiny aperture in the side of a dam; he was never adequately prepared for the force with which the flow of data hit him. The room changed; color bleeding out of the walls, lacing itself into abstract structures which permeated the room's volume. Galiana and Felka, dressed dourly a moment earlier, were now veiled in light, and appeared superhumanly beautiful. He could feel their thoughts, as if he were overhearing a heated conversation in the room next door. Most of it was nonverbal; Galiana and Felka playing an intense, abstract game. The thing floating between them was a solid lattice of light, resembling the plumbing diagram of an insanely complex refinery. It was constantly adjusting itself, with colored flows racing this way and that as the geometry changed. About half the volume was green; what remained was lilac, but now the former encroached dramatically on the latter.

Felka laughed; she was winning.

Galiana conceded and crashed back into her seat with a sigh of exhaustion, but she was smiling as well.

"Sorry. I appear to have distracted you," Clavain said.

"No; you just hastened the inevitable. I'm afraid Felka was always going to win."

The girl smiled again, still saying nothing, though Clavain sensed her victory; a hard-edged thing that for a moment outshone all other thoughts from her direction, eclipsing even Galiana's air of weary resignation.

Felka had been a failed Conjoiner experiment in the manipulation of foetal brain development; a child with a mind more machine than human. When he had first met her -- in Galiana's nest on Mars -- he had encountered a girl absorbed in a profound, endless game; directing the faltering self-repair processes of the terraforming structure known as the Great Wall of Mars, in which the nest was sheltered. She had no interest in people -- indeed; she could not even discriminate faces. But when the nest was being evacuated, Clavain had risked his life to save hers, even though Galiana had told him that the kindest thing would be to let her die. As Clavain had struggled to adjust to life as part of Galiana's commune, he had set himself the task of helping Felka to develop her latent humanity. She had begun to show signs of recognition in his presence, perhaps sensing on some level that they had a kinship; that they were both strangers stumbling toward a strange new light.

Galiana rose from her chair, carpets of light wrapping around her. "It was time to end the game, anyway. We've got work to do." She looked down at the girl, who was still staring at the lattice.

"Sorry, Felka. Later, maybe."

Clavain said: "How's she doing?"

"She's laughing, Nevil. That has to be progress, doesn't it?"

"I'd say that depends what she's laughing about."

"She beat me. She thought it was funny. I'd say that was a fairly human reaction, wouldn't you?"

"I'd still be happier if I could convince myself she recognized my face and not my smell, or the sound my footfalls make."

"You're the only one of us with a beard, Nevil. It doesn't take vast amounts of neural processing to spot *that*."

Clavain scratched his chin self-consciously as they stepped through into the shuttle's flight deck. He liked his beard, even though it was trimmed to little more than gray stubble so that he could slip a breather mask on without difficulty. It was as much a link to his past as his memories or the wrinkles Galiana had studiously built into his remodelled body.

"You're right, of course. Sometimes I just have to remind myself how far we've come."

Galiana smiled -- she was getting better at that, though there was still something a little forced about it -- and pushed her long, gray-veined black hair behind her ears. "I tell myself the same things when I think about you, Nevil."

"Mm. But I have come some way, haven't I?"

"Yes, but that doesn't mean you haven't got a considerable distance ahead of you. I could have put that thought into your head in a microsecond, if you allowed me to do so -- but you still insist that we communicate by making noises in our throats, the way monkeys do."

"Well, it's good practice for you," Clavain said, hoping that his irritation was not too obvious.

They settled into adjacent seats while avionic displays slithered into take-off configuration. Clavain's implants allowed him to fly the machine without any manual inputs at all, but -- old soldier that he was -- he generally preferred tactile controls. So his implants obliged, hallucinating a joystick inset with buttons and levers, and when he reached out to grasp it his hands seemed to close around something solid. He shuddered to think how thoroughly his perceptions of the real world were being doctored to support this illusion; but once he had been flying for a few minutes he generally forgot about it, lost in the joy of piloting.

He got them airborne, then settled the shuttle into level flight towards the fifth ruin that they would be visiting today. Kilometers of ice slid beneath them, only occasionally broken by a protruding ridge or a patch of dry, boulder-strewn ground.

"Just a few shacks, you said?"

Galiana nodded. "A waste of time, but we had to check it out."

"Any closer to understanding what happened to them?"

"They died, more or less overnight. Mostly through incidents related to the breakdown of normal thought -- although one or two may have simply died, as if they had some greater susceptibility to a toxin than the others."

Clavain smiled, feeling that a small victory was his. "Now you're looking at a toxin, rather than a psychosis?"

"A toxin's difficult to explain, Nevil."

"From Martin Setterholm's worms, perhaps?"

"Not very likely. Their biohazard containment measures weren't as good as ours -- but they were still adequate. We've analyzed those worms and we know they don't carry anything obviously hostile to us. And even if there were a neurotoxin, how would it affect everyone so quickly? Even if the lab workers had caught something, they'd have fallen ill before anyone else did, sending a warning to the others -- but nothing like that happened." She paused, anticipating Clavain's next question. "And no; I don't think that what happened to them is necessarily anything we need worry about, though that doesn't mean I'm going to rule anything out. But even our oldest technology's a century ahead of anything they had -- and we have the *Sandra Voi* to retreat to if we run into anything the medicines in our heads can't handle."

Clavain always did his best not to think too much about the swarms of sub-cellular machines lacing his brain -- supplanting much of it, in fact -- but there were times when it was unavoidable. He still had a squeamish reaction to the idea, though it was becoming milder. Now, though, he could not help but view the machines as his allies as intimately a part of him as his immune system.

Galiana was right: they would resist anything that tried to interfere with what now passed as the 'normal' functioning of his mind.

"Still," he said, not yet willing to drop his pet theory. "You've got to admit something: the Americans -- Setterholm especially -- were interested in the worms. Too interested, if you ask me."

"Look who's talking."

"Ah, but my interest is strictly forensic. And I can't help but put the two things together. They were interested in the worms. And they went mad."

What he said was an oversimplification, of course. It was clear enough that the worms had only preoccupied some of the Americans: those who were most interested in xeno-biology. According to the evidence the Conjoiners had so far gathered, the effort had been largely spearheaded by Setterholm, the man he had found dead at the bottom of the crevasse. Setterholm had traveled widely across Diadem's snowy wastes, gathering a handful of allies to assist in his work. He had found worms in dozens of ice-fields, grouped into vast colonies. For the most part the other members of the expedition had let him get on with his activities, even as they struggled with the day-to-day business of staying alive in what was still a hostile, alien environment.

Even before they had all died things had been far from easy. The self-replicating robots that had brought them here in the first place had failed years before, leaving the delicate life-support systems of their shelters to slowly collapse; each malfunction a little harder to rectify than the last. Diadem was getting colder, too -- sliding inexorably into a deep ice-age. It had been the Americans' misfortune to arrive at the coming of a great, centuries-long winter. Now, Clavain thought, it was colder still; the polar ice-caps rushing toward each other like long-separated lovers.

"It must have been fast, whatever it was," Clavain mused. "They'd already abandoned most of the outlying bases by then, huddling together back at the main settlement. By then they only had enough spare parts and technical know-how to run a single fusion power plant."

"Which failed."

"Yes -- but that doesn't mean much. It couldn't run itself, not by then -- it needed constant tinkering. Eventually the people with the right know-how must have succumbed to the... whatever it was -- and then the reactor stopped working and they all died of the cold. But they were in trouble long before the reactor failed."

Galiana seemed on the point of saying something. Clavain could always tell when she was about to speak; it was as if some leakage from her thoughts reached his brain even as she composed what she would say.

"Well?" he said, when the silence had stretched long enough.

"I was just thinking," she said. "A reactor of that type -- it doesn't need any exotic isotopes, does it? No tritium or deuterium?"

"No. Just plain old hydrogen. You could get all you needed from seawater."

"Or ice," Galiana said.

They vectored in for the next landing site. Toadstools, Clavain thought: half a dozen black metal towers of varying height surmounted by domed black habitat modules, interlinked by a web of elevated, pressurised walkways. Each of the domes was thirty or forty meters wide, perched a hundred or more metres above the ice, festooned with narrow, armored windows, sensors, and communications antennae. A tonguelike extension from one of the tallest domes was clearly a landing pad. In fact, as he came closer, he saw that there was an aircraft parked on it; one of the blunt-winged machines that the Americans had used to get around in. It was dusted with ice, but it would probably still fly with a little persuasion.

He inched the shuttle down, one of its skids only just inside the edge of the pad. Clearly the landing pad had only really been intended for one aircraft at a time.

"Nevil..." Galiana said. "I'm not sure I like this."

He felt tension, but could not be sure if it was his own or Galiana's leaking into his head.

"What don't you like?"

"There shouldn't be an aircraft here," Galiana said.

"Why not?"

She spoke softly, reminding him that the evacuation of the outlying settlements had been orderly, compared to the subsequent crisis. "This base should have been shut down and mothballed with all the others."

"Then someone stayed behind here," Clavain suggested.

Galiana nodded. "Or someone came back."

There was a third presence with them now another hue of thought bleeding into his mind. Felka had come into the cockpit. He could taste her apprehension.

"You sense it, too," he said, wonderingly, looking into the face of the terribly damaged girl. "Our discomfort. And you don't like it any more than we do, do you?"

Galiana took the girl's hand. "It's all right, Felka."

She must have said that just for Clavain's benefit. Before her mouth had even opened Galiana would have planted reassuring thoughts in Felka's mind, attempting to still the disquiet with the subtlest of neural adjustments. Clavain thought of an expert Ikebana artist minutely altering the placement of a single flower in the interests of harmony.

"Everything will be OK," Clavain said. "There's nothing here that can harm you."

Galiana took a moment, blank-eyed, to commune with the other Conjoiners in and around Diadem. Most of them were still in orbit, observing things from the ship. She told them about the aircraft and notified them that she and Clavain were going to enter the structure.

He saw Felka's hand tighten around Galiana's wrist.

"She wants to come as well," Galiana said.

"She'll be safer if she stays here."

"She doesn't want to be alone."

Clavain chose his words carefully. "I thought Conjoiners -- I mean we -- could never be truly alone, Galiana."

"There might be a communicational block inside the structure. It'll be better if she stays physically close to us."

"Is that the only reason?"

"No, of course not." For a moment he felt a sting of her anger, prickling his mind like sea-spray. "She's still human, Nevil -- no matter what we've done to her mind. We can't erase a million years of evolution. She may not be very good at recognizing faces, but she recognizes the need for companionship."

He raised his hands. "I never doubted it."

"Then why are you arguing?"

Clavain smiled. He'd had this conversation so many times before, with so many women. He had been married to some of them. It was oddly comforting to be having it again, light-years from home, wearing a new body, his mind clotted with machines and confronting the matriarch of what should have been a feared and hated hive-mind. At the epicenter of so much strangeness, a tiff was almost to be welcomed.

"I just don't want anything to hurt her."

"Oh. And I do?"

"Never mind," he said, gritting his teeth. "Let's just get in and out, shall we?"

The base, like all the American structures, had been built for posterity. Not by people, however, but by swarms of diligent self-replicating robots. That was how the Americans had reached Diadem: they had been brought here as frozen fertilized cells in the armored, radiation-proofed bellies of star-crossing von Neumann robots. The robots had been launched toward several solar systems about a century before the *Sandra Voi* had left Mars. Upon arrival on Diadem they had set about

breeding; making copies of themselves from local ores. When their numbers had reached some threshold they had turned over their energies to the construction of bases; luxurious accommodations for the human children that would then be grown in their wombs.

"The entrance door's intact," Galiana said, when they had crossed from the shuttle to the smooth black side of the dome, stooping against the wind. "And there's still some residual power in its circuits."

That was a Conjoiner trick that always faintly unnerved him. Like sharks, Conjoiners were sensitive to ambient electrical fields. Mapped into her vision, Galiana would see the energized circuits superimposed on the door like a ghostly neon maze. Now she extended her hand toward the lock, palm first.

"I'm accessing the opening mechanism. Interfacing with it now." Behind her mask, she saw her face scrunch in concentration. Galiana only ever frowned before when having to think hard. With her hand outstretched she looked like a wizard attempting some particularly demanding enchantment.

"Hmm," she said. "Nice old software protocols. Nothing too difficult."

"Careful," Clavain said. "I wouldn't put it past them to have put some kind of trap."

"There's no trap," she said. "But there is -- ah, yes -- a verbal entry code. Well, here goes." She spoke loudly, so that her voice could travel through the air to the door even above the howl of the wind: "*Open Sesame.*"

Lights flicked from red to green; dislodging a frosting of ice, the door slid ponderously aside to reveal a dimly lit interior chamber. The base must have been running on a trickle of emergency power for decades.

Felka and Clavain lingered while Galiana crossed the threshold. "Well?" she challenged, turning around. "Are you two sissies coming or not?"

Felka offered a hand. He took hers and the two of them -- the old soldier and the girl who could barely grasp the difference between two human faces -- took a series of tentative steps inside.

"What you just did; that business with your hand and the password..." Clavain paused. "That *was* a joke, wasn't it?"

Galiana looked at him blank-faced. "How could it have been? Everyone knows we haven't got anything remotely resembling a sense of humor."

Clavain nodded gravely. "That was my understanding, but I just wanted to be sure."

There was no trace of the wind inside, but it would still have been too cold to remove their suits, even had they not been concerned about contamination. They worked their way along a series of winding corridors, of which some were dark and some were bathed in feeble, pea-green lighting. Now and then they passed the entrance to a room full of equipment, but nothing that looked like a laboratory or living quarters. Then they descended a series of stairs and found themselves crossing one of the sealed walkways between the toadstools. Clavain had seen a few other American settlements built like this one; they were designed to remain useful even as they sank slowly into the ice.

The bridge led to what was obviously the main habitation section. Now there were lounges, bedrooms, laboratories, and kitchens -- enough for a crew of perhaps fifty or sixty. But there were no signs of any bodies, and the place did not look as if it had been abandoned in a hurry. The equipment was neatly packed away and there were no half-eaten meals on the tables. There was frost everywhere, but that was just the moisture that had frozen out of the air when the base cooled down.

"They were expecting to come back," Galiana said.

Clavain nodded. "They couldn't have had much of an idea of what lay ahead of them."

They moved on, crossing another bridge until they arrived in a toadstool that was almost entirely dedicated to bio-analysis laboratories. Galiana had to use her neural trick to get them inside again, the machines in her head sweet-talking the duller machines entombed in the doors. The low-

ceilinged labs were bathed in green light, but Galiana found a wall panel that brought the lighting up a notch and even caused some bench equipment to wake up, pulsing stand-by lights.

Clavain looked around, recognizing centrifuges, gene-sequencers, gas chromatographys, and scanning-tunnelling microscopes. There were at least a dozen other hunks of gleaming machinery whose function eluded him. A wall-sized cabinet held dozens of pull-out drawers, each of which contained hundreds of culture dishes, test-tubes, and gel slides. Clavain glanced at the samples, reading the tiny labels. There were bacteria and single-cell cultures with unpronounceable code names, most of which were marked with Diadem map coordinates and a date. But there were also drawers full of samples with Latin names; comparison samples that must have come from Earth. The robots could easily have carried the tiny parent organisms from which these larger samples had been grown or cloned. Perhaps the Americans had been experimenting with the hardiness of Earth-born organisms, with a view to terraforming Diadem at some point in the future.

He closed the drawer silently and moved to a set of larger sample tubes racked on a desk. He picked one from the rack and raised it to the light, examining the smoky things inside. It was a sample of worms, indistinguishable from those he had collected on the glacier a few hours earlier. A breeding tangle, probably, harvested from the intersection point of two worm tunnels. Some of the worms in the tangle would be exchanging genes; others would be fighting; others would be allowing themselves to be digested by adults or newly hatched young -- all behaving according to rigidly deterministic laws of caste and sex. The tangle looked dead, but that meant nothing with the worms. Their metabolism was fantastically slow; each individual easily capable of living for thousands of years. It would take them months just to crawl along some of the longer cracks in the ice, let alone move between some of the larger tangles.

But the worms were really not all that alien. They had a close terrestrial analog; the sun-avoiding ice-worms that had first been discovered in the Malaspina Glacier in Alaska toward the end of the nineteenth century. The Alaskan ice-worms were a lot smaller than their Diadem counterparts, but they also nourished themselves on the slim pickings that drifted onto the ice, or had been frozen into it years earlier. Like the Diadem worms, their most notable anatomical feature was a pore at the head end, just above the mouth. In the case of the terrestrial worms the pore served a single function; secreting a salty solution that helped the worms melt their way into ice when there was no tunnel already present -- an escape strategy that helped them get beneath the ice before the sun dried them up. The Diadem worms had a similar structure, but according to Setterholm's notes they have evolved a second use for it; secreting a chemically rich 'scent trail,' that helped other worms navigate through the tunnel system. The chemistry of that scent trail turned out to be very complex, with each worm capable of secreting not merely a unique signature but a variety of flavors. Conceivably, more complex message schemes were embedded in some of the other flavors: not just 'follow me' but 'follow me only if you are female' -- the Diadem worms had at least three sexes -- 'and this is breeding season.' There were many other possibilities, which Setterholm seemed to have been attempting to decode and catalog when the end had come.

It was interesting... up to a point. But even if the worms followed a complex set of rules dependent on the scent trails they were picking up, and perhaps other environmental cues, it would still only be rigidly mechanistic behavior.

"Nevil, come here."

That was Galiana's voice, but it was in a tone he had barely heard before. It was one that made him run to where Felka and Galiana were waiting on the other side of the lab.

They were facing an array of lockers that occupied an entire wall. A small status panel was set into each locker, but only one locker -- placed at chest height -- showed any activity. Clavain looked back to the door they had come in through, but from here it was hidden by intervening lab equipment. They would not have seen this locker even if it had been illuminated before Galiana brought the room's power back on.

"It might have been on all along," he said.

"I know," Galiana agreed.

She reached a hand up to the panel, tapping the control keys with unnerving fluency. Machines to Galiana were like musical instruments to a prodigy. She could pick one up cold and play it like an old friend.

The array of status lights changed configuration abruptly, then there was a bustle of activity somewhere behind the locker's metal face -- latches and servomotors clicking after decades of stasis.

"Stand back," Galiana said.

A rime of frost shattered into a billion sugary pieces. The locker began to slide out of the wall, the unhurried motion giving them adequate time to digest what lay inside. He felt Felka grip his hand, and then noticed that her other hand was curled tightly around Galiana's wrist. For the first time he began to wonder if it had really been such a good idea to allow the girl to join them.

The locker was two meters in length and half that in width and height, just sufficient to contain a human body. It had probably been designed to hold animal specimens culled from Diadem's oceans, but it was equally capable of functioning as a mortuary tray. That the man inside the locker was dead was beyond question, but there was no sign of injury. His composure -- flat on his back, his blue-grey face serenely blank, his eyes closed, and his hands clasped neatly just below his rib cage -- suggested to Clavain a saint lying in grace. His beard was neatly pointed and his hair long, frozen into a solid sculptural mass. He was still wearing several heavy layers of thermal clothing.

Clavain knelt closer and read the name tag above the man's heart.

"Andrew Iverson. Ring a bell?"

A moment went by while Galiana established a link to the rest of the Conjoiners, ferreting the name out of some database. "Yes. One of the missing. Seems he was a climatologist with an interest in terraforming techniques."

Clavain nodded shrewdly. "That figures, with all the microorganisms I've seen in this place. Well, the trillion-dollar question. How do you think he got in there?"

"I think he climbed in," Galiana said. And nodded at something which Clavain had missed, almost tucked away beneath the man's shoulder. Clavain reached into the gap, his finger brushing against the rock-hard fabric of Iverson's outfit. A catheter vanished into the man's forearm, where he had cut away a square of fabric. The catheter's black feed-line reached back into the cabinet, vanishing into a socket at the rear.

"You're saying he killed himself?"

"He must have put something in there that would stop his heart. Then he probably flushed out his blood and replaced it with glycerol, or something similar, to prevent ice-crystals forming in his cells. It would have taken some automation to make it work, but I'm sure everything he needed was here."

Clavain thought back to what he knew about the cryonic immersion techniques that had been around a century or so earlier. They left something to be desired now, but back then they had not been much of an advance over mummification.

"When he sank that catheter into himself, he couldn't have been certain we'd ever find him," Clavain remarked.

"Which would still have been preferable to suicide."

"Yes, but... the thoughts that must have gone through his head. Knowing he had to kill himself first to stand a chance of living again -- and then hope someone else stumbled on Diadem."

"You made a harder choice than that, once."

"Yes. But at least I wasn't alone when I made it."

Iverson's body was astonishingly well-preserved, Clavain thought. The skin tissue looked almost intact, even if it had a deathly, granitelike color. The bones of his face had not ruptured under the strain of the temperature drop. Bacterial processes had stopped dead. All in all, things could have been a lot worse.

"We shouldn't leave him like this," Galiana said, pushing the locker so that it began to slide back into the wall.

"I don't think he cares much about that now," Clavain said.

"No. You don't understand. He mustn't warm -- not even to the ambient temperature of the room. Otherwise we won't be able to wake him up."

It took five days to bring him back to consciousness.

The decision to reanimate had not been taken lightly; it had only been arrived at after intense discussion among the Conjoined, debates in which Clavain participated to the best of his ability. Iverson, they all agreed, could probably be resurrected with current Conjoiner methods. In situ scans of his mind had revealed preserved synaptic structures that a scaffold of machines could coax back toward consciousness. However, since they had not yet identified the cause of the madness which had killed Iverson's colleagues -- and the evidence was pointing toward some kind of infectious agent -- Iverson would be kept on the surface; reborn on the same world where he had died.

They had, however, moved him, shuttling him halfway across the world back to the main base. Clavain had traveled with the corpse, marveling at the idea that this solid chunk of man-shaped ice - - tainted, admittedly, with a few vital impurities -- would soon be a breathing, thinking, human being with memories and feelings. To him it seemed astonishing that this was possible; that so much latent structure had been preserved across the decades. Even more astonishing was that the infusions of tiny machines that the Conjoiners were brewing would be able to stitch together damaged cells and kick-start them back to life. And out of that inert loom of frozen brain structure - - a thing that was at this moment nothing more than a fixed geometric entity, like a finely eroded piece of rock -- something as malleable as consciousness would emerge.

But the Conjoiners were blasé at the prospect, viewing Iverson the way expert picture-restorers might view a damaged old master. Yes, there would be difficulties ahead -- work that would require great skill -- but nothing to lose sleep over.

Except, Clavain reminded himself, none of them slept anyway.

While the others were working to bring Iverson back to life, Clavain wandered the outskirts of the base, trying to get a better feel for what it must have been like in the last days. The debilitating mental illness must have been terrifying, as it struck even those who might have stood some chance of developing some kind of counter-agent to it. Perhaps in the old days, when the base had been under the stewardship of the von Neumann machines, something might have been done... but in the end it must have been like trying to crack a particularly tricky algebra problem while growing steadily more drunk: losing first the ability to focus sharply, then to focus on the problem at all, and then to remember what was so important about it anyway. The labs in the main complex had an abandoned look to them; experiments half-finished; notes on the wall scrawled in ever more incoherent handwriting.

Down in the lower levels -- the transport bays and storage areas -- it was almost as if nothing had happened. Equipment was still neatly racked, surface vehicles neatly parked, and -- with the base sub-systems back on -- the place was bathed in light and not so cold as to require extra clothing. It was quite therapeutic, too. The Conjoiners had not extended their communicational fields into these regions, so Clavain's mind was mercifully isolated again; freed of the clamor of other voices. Despite that, he was still tempted by the idea of spending some time outdoors.

With that in mind he found an airlock, one that must have been added late in the base's history as it was absent from the blueprints. There was no membrane stretched across this one; if he stepped through it he would be outside as soon as the doors cycled, with no more protection than the clothes he was wearing now. He considered going back into the base proper to find a membrane suit, but by the time he did that, the mood -- the urge to go outside -- would be gone.

Clavain noticed a locker. Inside, to his delight, was a rack of old-style suits such as Setterholm had been wearing. They looked brand-new, alloy neck-rings gleaming. Racked above each was a bulbous helmet. He experimented until he found a suit that fit him, then struggled with the various latches and seals that coupled the suit parts together. Even when he thought he had donned the suit properly, the airlock detected that one of his gloves wasn't latched correctly. It refused to let him outside until he reversed the cycle and fixed the problem.

But then he was outside, and it was glorious.

He walked around the base until he found his bearings, and then -- always ensuring that the base was in view and that his air-supply was adequate -- he set off across the ice. Above, Diadem's sky was a deep enamelled blue, and the ice -- though fundamentally white -- seemed to contain in itself a billion nuances of pale turquoise, pale aquamarine even hints of the palest of pinks. Beneath his feet he imagined the cracklike networks of the worms, threading down for hundreds of meters; and he imagined the worms themselves, wriggling through that network, responding to and secreting chemical scent trails. The worms themselves were biologically simple -- almost dismayingly so -- but that network was a vast, intricate thing. It hardly mattered that the traffic along it -- the to-and-fro motions of the worms as they went about their lives -- was so agonizingly slow. The worms, after all, had endured longer than human comprehension. They had seen people come and go in an eyeblink.

He walked on until he arrived at the crevasse where he had found Setterholm. They had long since removed Setterholm's body, of course, but the experience had imprinted itself deeply on Clavain's mind. He found it easy to relive the moment at the lip of the crevasse, when he had first seen the end of Setterholm's arm. At the time he had told himself that there must be worse places to die, surrounded by beauty that was so pristine, so utterly untouched by human influence. Now, the more that he thought about it, the more that Setterholm's death played on his mind -- he wondered if there could be any worse place. It was undeniably beautiful, but it was also crushingly dead, crushingly oblivious to life. Setterholm must have felt himself draining away, soon to become as inanimate as the palace of ice that was to become his tomb.

Clavain thought about it for many more minutes, enjoying the silence and the solitude and the odd awkwardness of the suit. He thought back to the way Setterholm had been found, and his mind niggled at something not quite right; a detail that had not seemed wrong at the time but that now troubled him.

It was Setterholm's helmet.

He remembered the way it had been lying away from the man's corpse, as if the impact had knocked it off. But now that Clavain had locked an identical helmet onto his own suit, that was harder to believe. The latches were sturdy, and he doubted that the drop into the crevasse would have been sufficient enough to break the mechanism. He considered the possibility that Setterholm had put his suit on hastily, but even that seemed unlikely now. The airlock had detected that Clavain's glove was badly attached; it -- or any of the other locks -- would have surely refused to allow Setterholm outside if his helmet had not been correctly latched.

Clavain wondered if Setterholm's death had been something other than an accident.

He thought about it, trying the idea on for size, then slowly shook his head. There were a myriad of possibilities he had yet to rule out. Setterholm could have left the base with his suit intact and then -- confused and disorientated -- he could have fiddled with the latch, depriving himself of oxygen until he stumbled into the crevasse. Or perhaps the airlocks were not as foolproof as they seemed, the safety mechanism capable of being disabled by people in a hurry to get outside.

No. A man had died, but there was no need to assume it had been anything other than an accident. Clavain turned and began to walk back to the base.

"He's awake," Galiana said, a day or so after the final wave of machines had swum into Iverson's mind. "I think it might be better if he spoke to you first, Nevil, don't you? Rather than one of us?"

She bit her tongue. "I mean, rather than someone who's been Conjoined for as long as the rest of us?"

Clavain shrugged. "Then again, an attractive face might be preferable to a grizzled old relic like myself. But I take your point. Is it safe to go in now?"

"Perfectly. If Iverson was carrying anything infectious, the machines would have flagged it."

"I hope you're right."

"Well, look at the evidence. He was acting rationally up to the end. He did everything to ensure we'd have an excellent chance of reviving him. His suicide was just a coldly calculated attempt to escape his then situation."

"Coldly calculated," Clavain echoed. "Yes, I suppose it would have been. Cold, I mean."

Galiana said nothing but gestured toward the door into Iverson's room.

Clavain stepped through the opening. And it was as he crossed the threshold that a thought occurred to him. He could once again see, in his mind's eye, Martin Setterholm's body lying at the bottom of the crevasse, his fingers pointing to the letters IVF.

In vitro fertilization.

But suppose Setterholm had been trying to write IVERSON but had died before finishing the word? If Setterholm had been murdered -- pushed into the crevasse -- he might have been trying to pass on a message about his murderer. Clavain imagined his pain: legs smashed, knowing with absolute certainty he was going to die alone and cold but willing himself to write Iverson's name...

But why would the climatologist have wanted to kill Setterholm? Setterholm's fascination with the worms was perplexing but harmless. The information Clavain had collected pointed to Setterholm being a single-minded loner; the kind of man who would inspire pity or indifference in his colleagues, rather than hatred. And everyone was dying anyway -- against such a background, a murder seemed almost irrelevant.

Maybe he was attributing too much to the six faint marks a dying man had scratched on the ice.

Forcing suspicion from his mind -- for now -- Clavain stepped into Iverson's room. The room was spartan but serene, with a small blue holographic window set high on one white wall. Clavain was responsible for that. Left to the Conjoiners -- who had taken over an area of the main American base and filled it with their own pressurized spaces -- Iverson's room would have been a grim, grey cube. That was fine for the Conjoiners -- they moved through informational fields draped like an extra layer over reality. But though Iverson's head was now drenched with their machines, they were only there to assist his normal patterns of thought, reinforcing weak synaptic signals and compensating for a far-from-equilibrium mix of neurotransmitters.

So Clavain had insisted on cheering the place up a bit; Iverson's bedsheets and pillow were now the same pure white as the walls, so that his head bobbed in a sea of whiteness. His hair had been trimmed, but Clavain had made sure that no one had done more than neatened Iverson's beard.

"Andrew?" he said. "I'm told you're awake now. I'm Nevil Clavain. How are you feeling?"

Iverson wet his lips before answering. "Better, I suspect, than I have any reason to feel."

"Ah." Clavain beamed, feeling that a large burden had just been lifted from his shoulders. "Then you've some recollection of what happened to you."

"I died, didn't I? I pumped myself full of anti-freeze and hoped for the best. Did it work, or is this just some weird-ass dream as I'm sliding toward brain death?"

"No, it sure as hell worked. That was one weird-heck-ass of a risk..." Clavain halted, not entirely certain that he could emulate Iverson's century-old speech patterns. "That was quite some risk you took. But you'll be glad to hear it did work."

Iverson lifted a hand from beneath the bedsheets, examining his palm and the pattern of veins and tendons on the rear. "This is the same body I went under with? You haven't stuck me in a robot or cloned me or hooked up my disembodied brain to a virtual-reality generator?"

"None of those things, no. Just mopped up some cell damage, fixed a few things here and there and -- um -- kick-started you back to the land of the living."

Iverson nodded, but Clavain could tell he was far from convinced. Which was unsurprising: Clavain, after all, had already told a small lie. "So how long was I under?"

"About a century, Andrew. We're an expedition from back home. We came by starship."

Iverson nodded again, as if this were mere, incidental detail. "We're aboard it now, right?"

"No... no. We're still on the planet. The ship's parked in orbit."

"And everyone else?"

No point sugaring the pill. "Dead, as far as we can make out. But you must have known that would happen."

"Yeah. But I didn't know for sure, even at the end."

"So what happened? How did you escape the infection or whatever it was?"

"Sheer luck." Iverson asked for a drink. Clavain fetched him one and at the same time had the room extrude a chair next to the bed.

"I didn't see much sign of luck," Clavain said.

"No; it was terrible. But I was the lucky one; that's all I meant. I don't know how much you know. We had to evacuate the outlying bases toward the end, when we couldn't keep more than one fusion reactor running." Iverson took a sip from the glass of water Clavain had brought him. "If we'd still had the machines to look after us..."

"Yes. That's something we never really understood." Clavain leant closer to the bed. "Those von Neumann machines were built to self-repair themselves, weren't they? We still don't see how they broke down."

Iverson eyed him. "They didn't. Breakdown, I mean."

"No? Then what happened?"

"We smashed them up. Like rebellious teenagers overthrowing parental control. The machines were nannying us, and we were sick of it. In hindsight, it wasn't such a good idea."

"Didn't the machines put up a fight?"

"Not exactly. I don't think the people that designed them ever thought they'd get trashed by the kids they'd lovingly cared for."

So, Clavain thought -- whatever had happened here, whatever he went on to learn, it was clear that the Americans had been at least partially the authors of their own misfortunes. He still felt sympathy for them, but now it was cooler, tempered with something close to disgust. He wondered if that feeling of disappointed appraisal would have come so easily without Galiana's machines in his head: *It would be just a tiny step to go from feeling that way toward Iverson's people to feeling that way about the rest of humanity... and then I'd know that I'd truly attained Transenlightenment...*

Clavain snapped out of his morbid line of thinking. It was not Transenlightenment that engendered those feelings, just ancient, bone-deep cynicism.

"Well, there's no point dwelling on what was done years ago. But how did you survive?"

"After the evacuation, we realized that we'd left something behind -- a spare component for the fusion reactor. So I went back for it, taking one of the planes. I landed just as a bad weather front was coming in, which kept me grounded there for two days. That was when the others began to get sick. It happened pretty quickly, and all I knew about it was what I could figure out from the comm-links back to the main base."

"Tell me what you did figure out."

"Not much," Iverson said. "It was fast, and it seemed to attack the central nervous system. No one survived it. Those that didn't die of it directly seemed to get themselves killed through accidents or sloppy procedure."

"We noticed. Eventually someone died who was responsible for keeping the fusion reactor running properly. It didn't blow up, did it?"

"No. Just spewed out a lot more neutrons than normal, too much for the shielding to contain. Then it went into emergency shutdown mode. Some people were killed by the radiation but most died of the cold that came afterward."

"Hm. Except you."

Iverson nodded. "If I hadn't had to go back for that component, I'd have been one of them. Obviously, I couldn't risk returning. Even if I could have got the reactor working again, there was still the problem of the contaminant." He breathed in deeply, as if steeling himself to recollect what had happened next. "So I weighed my options, and decided dying -- freezing myself -- was my only hope. No one was going to come from Earth to help me, even if I could have kept myself alive. Not for decades, anyway. So I took a chance."

"One that paid off."

"Like I said, I was the lucky one." Iverson took another sip from the glass Clavain had brought him. "Man, that tastes better than anything I've ever drunk in my life. What's in this, by the way?"

"Just water. Glacial water. Purified, of course."

Iverson nodded slowly and put the glass down next to his bed.

"Not thirsty now?"

"Quenched my thirst nicely, thank you."

"Good." Clavain stood up. "I'll let you get some rest, Andrew. If there's anything you need, anything we can do -- just call out."

"I'll be sure to."

Clavain smiled and walked to the door, observing Iverson's obvious relief that the questioning session was over for now. But Iverson had said nothing incriminating, Clavain reminded himself, and his responses were entirely consistent with the fatigue and confusion anyone would feel after so long a sleep -- or dead, depending on how you defined Iverson's period on ice. It was unfair to associate him with Setterholm's death just because of a few indistinct marks gouged in ice and the faint possibility that Setterholm had been murdered.

Still, Clavain paused before leaving the room. "One other thing, Andrew -- just something that's been bothering me, and I wondered if you could help?"

"Go ahead."

"Would the initials I, V, and F mean anything to you?"

Iverson thought about it for a moment, then shook his head. "Sorry, Nevil. You've got me there."

"Well, it was just a shot in the dark," Clavain said.

Iverson was strong enough to walk around the next day. He insisted on exploring the rest of the base, not simply the parts of it that the Conjoiners had taken over. He wanted to see for himself the damage that he had heard about and see the lists of the dead -- and the manner in which they had died -- that Clavain and his friends had assiduously compiled. Clavain kept a watchful eye on the man, aware of how emotionally traumatic the whole experience must be. He was bearing it well, but that could easily have been a front. Galiana's machines could tell a lot about how his brain was functioning, but they were unable to probe Iverson's state of mind at the resolution needed to map emotional well-being.

Clavain, meanwhile, strove as best he could to keep Iverson in the dark about the Conjoiners. He did not want to overwhelm Iverson with strangeness at this delicate time -- did not want to shatter the man's illusion that he had been rescued by a group of 'normal' human beings. But it turned out to be easier than he had expected, as Iverson showed surprisingly little interest in the history he had missed. Clavain had gone as far as telling him that the *Sandra Voi* was technically a ship full of refugees, fleeing the aftermath of a war between various factions of solar-system humanity -- but Iverson had done little more than nod, never probing Clavain for more details about the war. Once or twice Clavain had even alluded accidentally to the Transenlightenment -- that shared consciousness state that the Conjoiners had reached -- but Iverson had shown the same lack of interest. He was not even curious about the *Sandra Voi* herself, never once asking Clavain what the ship was like. It was not quite what Clavain had been expecting.

But there were rewards, too.

Iverson, it turned out, was fascinated by Felka, and Felka herself seemed pleasantly amused by the newcomer. It was, perhaps, not all that surprising: Galiana and the others had been busy helping Felka grow the neural circuitry necessary for normal human interactions, adding new layers to supplant the functional regions that had never worked properly -- but in all that time, they had never introduced her to another human being that she had not already met. And here was Iverson: not just a new voice but a new smell, a new face, a new way of walking, a deluge of new input for her starved mental routines. Clavain watched the way Felka latched onto Iverson when he entered a room, her attention snapping to him, her delight evident. And Iverson seemed perfectly happy to play the games that so wearied the others, the kind of intricate challenges that Felka adored. For hours on end he watched the two of them lost in concentration: Iverson pulling mock faces of sorrow or -- on the rare occasions when he beat her -- extravagant joy. Felka responded in kind, her face more animated -- more plausibly human -- than Clavain had ever believed possible. She spoke more often in Iverson's presence than she had ever done in his, and the utterances she made more closely approximated well-formed, grammatically sound sentences than the disjointed shards of language Clavain had grown to recognize. It was like watching a difficult, backward child suddenly come alight in the presence of a skilled teacher. Clavain thought back to the time when he had rescued Felka from Mars and how unlikely it had seemed then that she would ever grow into something resembling a normal adult human, as sensitized to others' feelings as she was to her own. Now, he could almost believe it would happen -- yet half the distance she had come had been due to Iverson's influence, rather than his own.

Afterwards, when even Iverson had wearied of Felka's ceaseless demands for games, Clavain spoke to him quietly, away from the others.

"You're good with her, aren't you."

Iverson shrugged, as if the matter was of no great consequence to him. "Yeah, I like her. We both enjoy the same kinds of games. If there's a problem --"

He must have detected Clavain's irritation. "No! No problem at all." Clavain put a hand on his shoulder. "There's more to it than just games, though, you have to admit..."

"She's a pretty fascinating case, Nevil."

"I don't disagree. We value her highly." He flinched, aware of how much the remark sounded like one of Galiana's typically flat statements. "But I'm puzzled. You've been revived after nearly a century asleep. We've come here by a ship that couldn't even have been considered a distant possibility in your own era. We've undergone massive social and technical upheavals in the last hundred years. There are things about us -- things about me -- I haven't told you yet. Things about *you* I haven't even told you yet."

"I'm just taking things one step at a time, that's all." Iverson shrugged and looked distantly past Clavain, through the window behind him. His gaze must have been skating across kilometers of ice toward Diadem's white horizon, unable to find a purchase. "I admit, I'm not really interested in technological innovations. I'm sure your ship's really nice, but... it's just applied physics. Just engineering. There may be some new quantum principles underlying your propulsion system, but if that's the case, it's probably just an elaborate curlicue on something that was already pretty baroque to begin with. You haven't smashed the light barrier, have you?" He read Clavain's expression accurately. "No -- didn't think so. Maybe if you had..."

"So what exactly does interest you?"

Iverson seemed to hesitate before answering, but when he did speak Clavain had no doubt that he was telling the truth. There was a sudden, missionary fervor in his voice. "Emergence. Specifically, the emergence of complex, almost unpredictable patterns from systems governed by a few, simple laws. Consciousness is an excellent example. A human mind's really just a web of simple neuronal cells wired together in a particular way. The laws governing the functioning of those individual cells aren't all that difficult to grasp -- a cascade of well-studied electrical, chemical, and enzymic processes. The tricky part is the wiring diagram. It certainly isn't encoded in DNA in any but the

crudest sense. Otherwise why would a baby bother growing neural connections that are pruned down before birth? That'd be a real waste -- if you had a perfect blueprint for the conscious mind, you'd only bother forming the connections you needed. No the mind organizes itself during growth, and that's why it needs so many more neurones that it'll eventually incorporate into functioning networks. It needs the raw material to work with as it gropes its way toward a functioning consciousness. The pattern emerges, bootstrapping itself into existence, and the pathways that aren't used -- or aren't as efficient as others -- are discarded." Iverson paused. "But how this organization happens really isn't understood in any depth. Do you know how many neurones it takes to control the first part of a lobster's gut, Nevil? Have a guess, to the nearest hundred."

Clavain shrugged. "I don't know. Five hundred? A thousand?"

"No. Six. Not six hundred, just six. Six damned neurones. You can't get much simpler than that. But it took decades to understand how those six worked together, let alone how that particular network evolved. The problems aren't inseparable, either. You can't really hope to understand how ten billion neurones organize themselves into a functioning whole unless you understand how the whole actually functions. Oh, we've made some progress -- we can tell you exactly which spinal neurones fire to make a lamprey swim, and how that firing pattern maps into muscle motion -- but we're a long way from understanding how something as elusive as the concept of 'I' emerges in the developing human mind. Well, at least we were before I went under. You may be about to tell me you've achieved stunning progress in the last century, but something tells me you were too busy with social upheaval for that."

Clavain felt an urge to argue -- angered by the man's tone -- but suppressed it, willing himself into a state of serene acceptance. "You're probably right. We've made progress in the other direction -- augmenting the mind as it is -- but if we genuinely understood brain development, we wouldn't have ended up with a failure like Felka."

"Oh, I wouldn't call her a failure, Nevil."

"I didn't mean it like that."

"Of course not." Now it was Iverson's turn to place a hand on Clavain's shoulder. "But you must see now why I find Felka so fascinating. Her mind is damaged -- you told me that yourself, and there's no need to go into the details -- but despite that damage, despite the vast abyss in her head, she's beginning to self-assemble the kinds of higher-level neural routines we all take for granted. It's as if the patterns were always there as latent potentials, and it's only now that they're beginning to emerge. Isn't that fascinating? Isn't it something worthy of study?"

Delicately, Clavain removed the man's hand from his shoulder. "I suppose so. I had hoped, however, that there might be something more to it than study."

"I've offended you, and I apologize. My choice of phrase was poor. Of course I care for her."

Clavain felt suddenly awkward, as if he had misjudged a fundamentally decent man. "I understand. Look, ignore what I said."

"Yeah, of course. It -- um -- will be all right for me to see her again, won't it?"

Clavain nodded. "I'm sure she'd miss you if you weren't around."

Over the next few days Clavain left the two of them to their games, only rarely eavesdropping to see how things were going. Iverson had asked permission to show Felka around some of the other areas of the base, and, after some initial misgivings, Clavain and Galiana had both agreed to his request. After that, long hours went by when the two of them were not to be found. Clavain had tracked them once, watching as Iverson led the girl into a disused lab and showed her intricate molecular models. They clearly delighted her: vast fuzzy holographic assemblages of atoms and chemical bonds that floated in the air like Chinese dragons. Wearing cumbersome gloves and goggles, Iverson and Felka were able to manipulate the mega-molecules; forcing them to fold into minimum-energy configurations that brute-force computation would have struggled to predict. As they gestured into the air and made the dragons contort and twist, Clavain watched for the

inevitable moment when Felka would grow bored and demand something harder. But it never came. Afterwards -- when she had returned to the fold, her face shining with wonder -- it was as if Felka had undergone a spiritual experience. Iverson had shown her something which her mind could not instantly encompass, a problem too large and subtle to be stormed in a flash of intuitive insight.

Seeing that, Clavain again felt guilty about the way he had spoken to Iverson, and knew that he had not completely put aside his doubts about the message Setterholm had left in the ice. But -- the riddle of the helmet aside -- there was no reason to think that Iverson might be a murderer beyond those haphazard marks. Clavain had looked into Iverson's personnel records from the time before he was frozen, and the man's history was flawless. He had been a solid, professional member of the expedition, well-liked and trusted by the others. Granted, the records were patchy, and since they were stored digitally they could have been doctored to almost any extent. But then much the same story was told by the hand-written diary and verbal log entries of some of the other victims. Andrew Iverson's name came up again and again as a man regarded with affection by his fellows -- most certainly not someone capable of murder. Best, then, to discard the evidence of the marks and give him the benefit of the doubt.

Clavain spoke of his fears to Galiana, and while she listened to him, she only came back with exactly the same rational counterarguments that he had already provided for himself.

"The problem is," Galiana said, "that the man you found in the crevasse could have been severely confused, perhaps even hallucinatory. That message he left -- if it was a message and not a set of random gouge marks he left while convulsing -- could mean anything at all."

"We don't know that Setterholm was confused," Clavain protested.

"We don't? Then why didn't he make sure his helmet was on properly? It couldn't have been latched fully or it wouldn't have rolled off him when he hit the bottom of the crevasse."

"Yes," Clavain said. "But I'm reasonably sure he wouldn't have been able to leave the base if his helmet hadn't been latched."

"In which case he must have undone it afterwards."

"Yes, but there's no reason for him to have done that, unless..."

Galiana gave him a thin-lipped smile. "Unless he was confused. Back to square one, Nevil."

"No," he said, conscious that he could almost see the shape of something -- something that was close to the truth if not the truth itself. "There's another possibility, one I hadn't thought of until now."

Galiana squinted at him, that rare frown appearing. "Which is?"

"That someone else removed his helmet for him."

They went down into the bowels of the base. In the dead space of the equipment bays Galiana became ill at ease. She was not used to being out of communicational range of her colleagues. Normally systems buried in the environment picked up neural signals from individuals, amplifying and re-broadcasting them to other people, but there were no such systems here. Clavain could hear Galiana's thoughts, but they came in weak, like a voice from the sea almost drowned by the roar of the surf.

"This had better be worth it," Galiana said.

"I want to show you the airlock," Clavain answered. "I'm sure Setterholm must have left here with his helmet properly attached."

"You still think he was murdered?"

"I think it's a remote possibility that we should be very careful not to discount."

"But why would anyone kill a man whose only interest was a lot of harmless ice worms?"

"That's been bothering me as well."

"And?"

"I think I have an answer. Half of one, anyway. What if his interest in the worms brought him into conflict with the others? I'm thinking about the reactor."

Galiana nodded. "They'd have needed to harvest ice for it."

"Which Setterholm might have seen as interfering with the worms' ecology. Maybe he made a nuisance of himself and someone decided to get rid of him."

"That would be a pretty extreme way of dealing with him."

"I know," Clavain said, stepping through a connecting door into the transport bay. "I said I had half an answer, not all of one."

As soon as he was through he knew something was amiss. The bay was not as it had been before, when he had come down here scouting for clues. He dropped his train of thought immediately, focussing only on the now.

The room was much, much colder than it should have been. And lighter. There was an oblong of chill blue daylight spilling across the floor from the huge open door of one of the vehicle exit ramps. Clavain looked at it in mute disbelief, wanting it to be a temporary glitch in his vision. But Galiana was with him, and she had seen it, too.

"Someone's left the base," she said.

Clavain looked out across the ice. He could see the wake that the vehicle had left in the snow, arcing out toward the horizon. For a long moment they stood at the top of the ramp, frozen into inaction. Clavain's mind screamed with the implications. He had never really liked the idea of Iverson taking Felka away with him elsewhere in the base, but he had never considered the possibility that he might take her into one of the blind zones. From here, Iverson must have known enough little tricks to open a surface door, start a rover, and leave without any of the Conjoiners realizing.

"Nevil, listen to me," Galiana said. "He doesn't necessarily mean her any harm. He might just want to show her something."

He turned to her. "There isn't time to arrange a shuttle. That trick you did a few days ago, talking to the door? Do you think you can manage it again?"

"I don't need to. The door's already open."

Clavain nodded at one of the other rovers hulking behind them. "It's not the door I'm thinking about."

Galiana was disappointed; it took her three minutes to convince the machine to start, rather than the few dozen seconds she said it should have taken. She was, she told Clavain, in serious danger of getting rusty at this sort of thing. Clavain just thanked the gods that there had been no mechanical sabotage to the rover; no amount of neural intervention could have fixed that.

"That's another thing that makes it look like this is just an innocent trip outside," Galiana said. "If he'd really wanted to abduct her, it wouldn't have taken much additional effort to stop us from following him. If he'd closed the door, as well, we might not even have noticed he was gone."

"Haven't you ever heard of reverse psychology?" Clavain said.

"I still can't see Iverson as a murderer, Nevil." She checked his expression, her own face calm despite her driving the machine. Her hands were folded in her lap. She was less isolated now, having used the rover's comm-systems to establish a link back to the other Conjoiners. "Setterholm, maybe. The obsessive loner and all that. Just a shame he's the dead one."

"Yes," Clavain said, uneasily.

The rover itself ran on six wheels; a squat, pressurized hull perched low between absurd-looking balloon tires. Galiana gunned them hard down the ramp and across the ice, trusting the machine to glide harmlessly over the smaller crevasses. It seemed reckless, but if they followed the trail that Iverson had left, they were almost guaranteed not to hit any fatal obstacles.

"Did you get anywhere with the source of the sickness?" Clavain asked.

"No breakthroughs yet..."

"Then here's a suggestion. Can you read my visual memory accurately?" Clavain did not need an answer. "While you were finding Iverson's body, I was looking over the lab samples. There were a lot of terrestrial organisms there. Could one of those have been responsible?"

"You'd better replay the memory."

Clavain did; picturing himself looking over the rows of culture dishes, test-tubes, and gel-slides, concentrating especially on those that had come from Earth rather than the locally-obtained samples. In his mind's eye the sample names refused to snap into clarity, but the machines that Galiana had seeded through his mind would already be locating the eidetically-stored short-term memories and retrieving them with a clarity beyond the capabilities of Clavain's own brain.

"Now see if there's anything there that might do the job."

"A terrestrial organism?" Galiana sounded surprised. "Well, there might be something there, but I can't see how it could have spread beyond the laboratory unless someone wanted it to."

"I think that's exactly what happened."

"Sabotage?"

"Yes."

"Well, we'll know sooner or later. I've passed the information to the others. They'll get back to me if they find a candidate. But I still don't see why anyone would sabotage the entire base, even if it was possible. Overthrowing the von Neumann machines is one thing... mass suicide is another."

"I don't think it was mass suicide. Mass murder, maybe."

"And Iverson's your main suspect?"

"He survived, didn't he? And Setterholm scrawled a message in the ice just before he died. It must have been a warning about him." But even as he spoke, he knew there was a second possibility, one that he could not quite focus on.

Galiana swerved the rover to avoid a particularly deep and yawning chasm, shaded with vivid veins of turquoise blue.

"There's a small matter of a missing motive."

Clavain looked ahead, wondering if the thing he saw glinting in the distance was a trick of the eye. "I'm working on that," he said.

Galiana halted them next to the other rover. The two machines were parked at the lip of a slope-sided depression in the ice. It was not really steep enough to call a crevasse, although it was at least thirty or forty meters deep. From the rover's cab it was not possible to see all the way into the powdery-blue depths, although Clavain could certainly see the fresh footprints which descended into them. Up on the surface marks like that would have been scoured away by the wind in days or hours, so these prints were very fresh. There were, he observed, two sets -- someone heavy and confident and someone lighter, less sure of her footing.

Before they had taken the rover they had made sure that there were two suits aboard it. They struggled into them, fiddling with the latches.

"If I'm right," Clavain said, "this kind of precaution isn't really necessary. Not for avoiding the sickness, anyway. But better safe than sorry."

"Excellent timing," Galiana said, snapping down her helmet and giving it a quarter twist to lock into place. "They've just pulled something from your memory, Nevil. There's a family of single-celled organisms called dinoflagellates, one of which was present in the lab where we found Iverson. Something called *pfiesteria piscicida*. Normally it's an ambush predator that attacks fish."

"Could it have been responsible for the madness?"

"It's at least a strong contender. It has a taste for mammalian tissue as well. If it gets into the human nervous system it produces memory loss and disorientation, as well as a host of physical effects. It could have been dispersed as a toxic aerosol released into the base's air-system. Someone with access to the lab's facilities could have turned it from something merely nasty to something deadly, I think."

"We should have pinpointed it, Galiana. Didn't we swab the air ducts?"

"Yes, but we weren't looking for something terrestrial. In fact we were excluding terrestrial organisms; only filtering for the basic biochemical building blocks of Diadem life. We just weren't thinking in criminal terms."

"More fool us," Clavain said.

Suited now, they stepped outside. Clavain began to regret his haste in leaving the base so quickly -- at having to make do with these old suits and lacking any means of defense. Wanting something in his hand for moral support, he examined the equipment stowed around the outside of the rover until he found an ice pick. It would not be much of a weapon, but he felt better for it.

"You won't need that," Galiana said.

"What if Iverson turns nasty?"

"You still won't need it."

But he kept it anyway -- an ice pick was an ice pick, after all -- and the two of them walked to the point where the icy ground began to curve over. Clavain examined the wrist of his suit, studying the cryptic and old-fashioned matrix of keypads that controlled the suit's functions. On a whim he pressed something promising and was gratified when he felt crampon spikes from the soles of his boots anchoring him to the ice.

"Iverson!" he shouted. "Felka!"

But sound carried poorly beyond his helmet, and the ceaseless, whipping wind would have snatched his words away from the crevasse. There was nothing to do but make the difficult trek into the blue depths. He led the way, his heart pounding in his chest, the old suit awkward and top-heavy. He almost lost his footing once or twice and had to stop to catch his breath once he reached the level bottom of the depression, sweat running into his eyes.

He looked around. The footprints led horizontally for ten or fifteen meters, weaving between fragile, curtainlike formations of opal ice. On some clinical level he acknowledged that the place had a sinister charm -- he imagined the wind breathing through those curtains of ice, making ethereal music -- but the need to find Felka eclipsed such considerations. He focused only on the low, dark blue hole of a tunnel in the ice ahead of them. The footprints vanished into the tunnel.

"If the bastard's taken her..." Clavain said, tightening his grip on the pick. He switched on his helmet light and stooped into the tunnel, Galiana behind him. It was hard going; the tunnel wriggled, rose, and descended for many tens of meters, and Clavain was unable to decide whether it was some weird natural feature -- carved, perhaps, by a hot sub-glacial river -- or whether it had been dug by hand, much more recently. The walls were veined by worm tracks, a marbling like an immense magnification of the human retina. Here and there Clavain saw the dark smudges of worms moving through cracks that were very close to the surface, though he knew it was necessary to stare at them for long seconds before any movement was discernible. He groaned, the stooping becoming painful, and then the tunnel widened out dramatically. He realized that he had emerged in a much larger space.

It was still underground, although the ceiling glowed with the blue translucence of filtered daylight. The covering of ice could not have been more than a meter or two thick; a thin shell stretched like a dome over tens of meters of yawning nothing. Nearly sheer walls of delicately patterned ice rose up from a level, footprint-dappled floor.

"Ah," said Iverson, who was standing near one wall of the chamber. "You decided to join us."

Clavain felt a stab of relief, seeing that Felka was standing not far from him, next to a piece of equipment Clavain failed to recognize. Felka seemed unharmed. She turned toward him, the peculiar play of light and shade on her helmeted face making her seem older than she was.

"Nevil," he heard Felka say. "Hello."

He crossed the ice, fearful that the whole marvelous edifice was about to come crashing down on them all.

"Why did you bring her here, Iverson?"

"There's something I wanted to show her. Something I knew she'd like, even more than the other things." He turned to the smaller figure near him. "Isn't that right, Felka?"

"Yes."

"And do you like it?"

Her answer was matter-of-fact, but it was closer to conversation than anything Clavain had ever heard from her lips.

"Yes. I do like it."

Galiana stepped ahead of him and extended a hand to the girl. "Felka? I'm glad you like this place. I like it, too. But now it's time to come back home."

Clavain steeled himself for an argument, some kind of show-down between the two women, but to his immense relief Felka walked casually toward Galiana.

"I'll take her back to the rover," Galiana said. "I want to make sure she hasn't had any problems breathing with that old suit on."

A transparent lie, but it would suffice.

Then she spoke to Clavain. It was a tiny thing, almost inconsequential, but she placed it directly in his head.

And he understood what he would have to do.

When they were alone, Clavain said: "You killed him."

"Setterholm?"

"No. You couldn't have killed Setterholm because you are Setterholm." Clavain looked up, the arc of his helmet light tracing the filamentary patterning until it became too tiny to resolve, blurring into an indistinct haze of detail that curved over into the ceiling itself. It was like admiring a staggeringly ornate fresco.

"Nevil, do me a favor? Check the settings on your suit, in case you're not getting enough oxygen?"

"There's nothing wrong with my suit." Clavain smiled, the irony of it all delicious. "In fact, it was the suit that really tipped me off. When you pushed Iverson into the crevasse, his helmet came off. That couldn't have happened unless it wasn't fixed properly in the first place -- and *that* couldn't have happened unless someone had removed it after the two of you left the base."

Setterholm -- he was sure the man was Setterholm -- snorted derisively, but Clavain continued speaking.

"Here's my stab at what happened, for what it's worth. You needed to swap identities with Iverson because Iverson had no obvious motive for murdering the others, whereas Setterholm certainly did."

"And I don't suppose you have any idea what that motive might have been?"

"Give me time; I'll get there eventually. Let's just deal with the lone murder first. Changing the electronic records was easy enough -- you could even swap Iverson's picture and medical data for your own -- but that was only part of it. You also needed to get Iverson into your clothes and suit, so that we'd assume the body in the crevasse belonged to you, Setterholm. I don't know exactly how you did it."

"Then perhaps..."

Clavain carried on. "But my guess is you let him catch a dose of the bug you let loose in the main base -- *pfisteria*, wasn't it? -- then followed him while he went walking outside. You jumped him, knocked him down on the ice, and got him out of the suit and into yours. He was probably unconscious by then, I suppose. But then he must have started coming round, or you panicked for another reason. You jammed the helmet on and pushed him into the crevasse. Maybe if all that had happened was his helmet coming off, I wouldn't have dwelled on it. But he wasn't dead, and he lived long enough to scratch a message in the ice. I thought it concerned his murderer, but I was wrong. He was trying to tell me who he was. Not Setterholm, but Iverson."

"Nice theory." Setterholm glanced down at a display screen in the back of the machine that squatted next to him. Mounted on a tripod, it resembled a huge pair of binoculars, pointed with a slight elevation toward one wall of the chamber.

"Sometimes, a theory's all you need. That's quite a toy you've got there, by the way. What is it, some kind of ground-penetrating radar?"

Setterholm brushed aside the question. "If I was him -- why would I have done it? Just because I was interested in the ice-worms?"

"It's simple," Clavain said, hoping the uncertainty he felt was not apparent in his voice. "The others weren't as convinced as you were of the worms' significance. Only you saw them for what they were." He was treading carefully here, masking his ignorance of Setterholm's deeper motives by playing on the man's vanity.

"Clever of me if I did."

"Oh, yes. I wouldn't doubt that at all. And it must have driven you to distraction, that you could see what the others couldn't. Naturally, you wanted to protect the worms when you saw them under threat."

"Sorry, Nevil, but you're going to have to try a lot harder than that." He paused and patted the machine's mate-silver casing, clearly unable to pretend that he did not know what it was. "It's a radar, yes. It can probe the interior of the glacier with sub-centimeter resolution, to a depth of several tens of meters."

"Which would be rather useful if you wanted to study the worms."

Setterholm shrugged. "I suppose so. A climatologist interested in glacial flow might also have use for the information."

"Like Iverson?" Clavain took a step closer to Setterholm and the radar equipment. He could see the display more clearly now: a fibrous tangle of mainly green lines slowly spinning in space, with a denser structure traced out in red near its heart. "Like the man you killed?"

"I told you, I'm Iverson."

Clavain stepped toward him with the ice pick held double-handed, but when he was a few meters from the man he veered past and made his way to the wall. Setterholm had flinched, but he had not seemed unduly worried that Clavain was about to try to hurt him.

"I'll be frank with you," Clavain said, raising the pick. "I don't really understand what it is about the worms."

"What are you going to do?"

"This."

Clavain smashed the pick against the wall as hard as he was able. It was enough: a layer of ice fractured noisily away, sliding down like a miniature avalanche to land in pieces at his feet; each fist-sized shard veined with worm trails.

"Stop," Setterholm said.

"Why? What do you care, if you're not interested in the worms?"

Clavain smashed the ice again, dislodging another layer.

"You..." Setterholm paused. "You could bring the whole place down on us if you're not careful."

Clavain raised the pick again, letting out a groan of effort as he swung. This time he put all his weight behind the swing, all his fury, and a chunk the size of his upper body calved noisily from the wall.

"I'll take that risk," Clavain said.

"No. You've got to stop."

"Why? It's only ice."

"No!"

Setterholm rushed him, knocking him to his feet. The ice pick spun from his hand and the two of them crashed into the ground, Setterholm landing on his chest. He pressed his faceplate close to Clavain's, every bead of sweat on his forehead gleaming like a precise little jewel.

"I told you to stop."

Clavain found it hard to speak with the pressure on his chest but forced out the words with effort. "I think we can dispense with the charade that you're Iverson now, can't we?"

"You shouldn't have harmed it."

"No... and neither should the others, eh? But they needed that ice very badly."

Now Setterholm's voice held a tone of dull resignation. "The reactor, you mean?"

"Yes. The fusion plant." Clavain allowed himself to feel some small satisfaction, before adding: "Actually, it was Galiana who made the connection, not me. That the reactor ran on ice, I mean. And after all the outlying bases had been evacuated, they had to keep everyone alive back at the main one. And that meant more load on the reactor. Which meant it needed more ice, of which there was hardly a shortage in the immediate vicinity."

"But they couldn't be allowed to harvest the ice. Not after what I'd discovered."

Clavain nodded, observing that the reversion from Iverson to Setterholm was now complete.

"No. The ice was precious, wasn't it. Infinitely more so than anyone else realized. Without that ice the worms would have died..."

"You don't understand either, do you?"

Clavain swallowed. "I think I understand more than the others, Setterholm. You realized that the worms --"

"It wasn't the damned worms!" He had shouted -- Setterholm had turned on a loudspeaker function in his suit that Clavain had not located yet -- and for a moment the words crashed around the great ice chamber, threatening to start the tiny chain reaction of fractures that would collapse the whole. But when silence had returned -- disturbed only by the rasp of Clavain's breathing -- nothing had changed.

"It wasn't the worms?"

"No." Setterholm was calmer now, as if the point had been made. "No -- not really. They were important, yes -- but as low-level elements in a much more complex system. Don't you understand?"

Clavain strove for honesty. "I never really understood what it was that fascinated you about them. They seemed quite simple to me."

Setterholm removed his weight from Clavain and rose up on to his feet again. "That's because they are. A child could grasp the biology of a single ice-worm in an afternoon. Felka did, in fact. Oh, she's wonderful, Nevil." Setterholm's teeth flashed a smile that chilled Clavain. "The things she could unravel... she isn't a failure, not at all. I think she's something miraculous we barely comprehend."

"Unlike the worms."

"Yes. They're like clockwork toys; programmed with a few simple rules." Setterholm stooped down and grabbed the ice pick for himself. "They always respond in exactly the same way to the same input stimulus. And the kinds of stimuli they respond to are simple in the extreme: a few gradations of temperature, a few biochemical cues picked up from the ice itself. But the emergent properties..."

Clavain forced himself to a sitting position. "There's that word again."

"It's the network, Nevil. The system of tunnels the worms dig through the ice. Don't you understand? That's where the real complexity lies. That's what I was always more interested in. Of course, it took me years to see it for what it was..."

"Which was?"

"A self-evolving network. One that has the capacity to adapt; to learn."

"It's just a series of channels bored through ice, Setterholm."

"No. It's infinitely more than that." The man craned his neck as far as the architecture of his suit would allow, revelling in the palatial beauty of the chamber. "There are two essential elements in any neural network, Nevil. Connections and nodes are necessary, but not enough. The connections

must be capable of being weighted, adjusted in strength according to usefulness. And the nodes must be capable of processing the inputs from the connections in a deterministic manner, like logic gates." He gestured around the chamber. "Here, there is no absolutely sharp distinction between the connections and the nodes, but the essence remain. The worms lay down secretions when they travel, and those secretions determine how other worms make use of the same channels; whether they utilize one route or another. There are many determining factors: the sexes of the worms, the seasons; the others I won't bore you with. But the point is simple. The secretions -- and the effect they have on the worms -- mean that the topology of the network is governed by subtle emergent principles. And the breeding tangles function as logic gates, processing the inputs from their connecting nodes according to the rules of worm sex, caste, and hierarchy. It's messy, slow, and biological -- but the end result is that the worm colony as a whole functions as a neural network. It's a program that the worms themselves are running, even though any given worm hasn't a clue that it's a part of a larger whole."

Clavain absorbed all that and thought carefully before asking the question that occurred to him. "How does it change?"

"Slowly," Setterholm said. "Sometimes routes fall into disuse because the secretions inhibit other worms from using them. Gradually, the glacier seals them shut. At the same time other cracks open by chance -- the glacier's own fracturing imposes a constant chaotic background on the network -- or the worms bore new holes. Seen in slow-motion -- our time frame -- almost nothing ever seems to happen, let alone change. But imagine speeding things up, Nevil. Imagine if we could see the way the network has changed over the last century or the last thousand years... imagine what we might find. A constantly evolving loom of connections, shifting and changing eternally. Now, does that remind you of anything?"

Clavain answered in the only way that he knew would satisfy Setterholm. "A mind, I suppose. A newborn one, still forging neural connections."

"Yes. Oh, you'd undoubtedly like to point out that the network is isolated, so it can't be responding to stimuli beyond itself -- but we can't know that for certain. A season is like a heartbeat here, Nevil! What we think of as a geologically slow processes -- a glacier cracking or two glaciers colliding -- those events could be as forceful as caresses and sounds to a blind child." He paused and glanced at the screen in the back of the imaging radar. "That's what I wanted to find out. A century ago, I was able to study the network for a handful of decades. And I found something that astonished me. The colony moves -- reshapes itself constantly -- as the glacier shifts and breaks up. But no matter how radically the network changes its periphery; no matter how thoroughly the loom evolves, there are deep structures inside the network that are always preserved." Setterholm's finger traced the red mass at the heart of the green tunnel map. "In the language of network topology, the tunnel system is scale-free rather than exponential. It's the hallmark of a highly organized network with a few rather specialized processing centers -- hubs, if you like. This is one. I believe its function is to cause the whole network to move away from a widening fracture in the glacier. It would take me much more than a century to know for sure, although everything I've seen here confirms what I thought originally. I mapped other structures in other colonies, too. They can be huge, spread across cubic kilometers of ice. But they always persist. Don't you see what that means? The network has begun to develop specialized areas of function. It's begun to process information, Nevil. It's begun to creep its way toward thought."

Clavain looked around him once more, trying to see the chamber in the new light that Setterholm had revealed. Think not of the worms as entities in their own right, he thought, but as electrical signals, ghosting along synaptic pathways in a neural network made of solid ice.

He shivered. It was the only appropriate response.

"Even if the network processes information... there's no reason to think it could ever become conscious."

"Why, Nevil? What's the fundamental difference between perceiving the universe via electrical signals transmitted along nerve tissue and via fracture patterns moving through a vast block of ice?"

"I suppose you have a point."

"I had to save them, Nevil. Not just the worms, but the network they were a part of. We couldn't come all this way and just wipe out the first thinking thing we'd ever encountered in the universe, just because it didn't fit into our neat little preconceived notions of what alien thought would actually be like."

"But saving the worms meant killing everyone else."

"You think I didn't realize that? You think it didn't agonize me to do what I had to do? I'm a human being, Nevil -- not a monster. I knew exactly what I was doing and I knew exactly what it would make me look like to anyone who came here afterwards."

"But you still did it."

"Put yourself in my shoes. How would you have acted?"

Clavain opened his mouth, expecting an answer to spring to mind. But nothing came, not for several seconds. He was thinking about Setterholm's question, more thoroughly than he had done so far. Until then he had satisfied himself with the quiet, unquestioned assumption that he would not have acted the way Setterholm had done. But could he really be so sure? Setterholm, after all, had truly believed that the network formed a sentient whole, a thinking being. Possessing that knowledge must have made him feel divinely chosen, sanctioned to commit any act to preserve the fabulously rare thing he had found. And he had, after all, been right.

"You haven't answered me."

"That's because I thought the question warranted something more than a flippant answer, Setterholm. I like to think I wouldn't have acted the way you did, but I don't suppose I can ever be sure of that."

Clavain stood up, inspecting his suit for damage, relieved that the scuffle had not injured him.

"You'll never know."

"No. I never will. But one thing's clear enough. I've heard you talk, heard the fire in your words. You believe in your network, and yet you still couldn't make the others see it. I doubt I'd have been able to do much better, and I doubt that I'd have thought of a better way to preserve what you'd found."

"Then you'd have killed everyone, just like I did?"

The realization of it was like a hard burden someone had just placed on his shoulders. It was so much easier to feel incapable of such acts. But Clavain had been a soldier. He had killed more people than he could remember, even though those days had been a long time ago. It was really a lot less difficult to do when you had a cause to believe in.

And Setterholm had definitely had a cause.

"Perhaps," Clavain said. "Perhaps I might have, yes."

He heard Setterholm sigh. "I'm glad. For a moment "

"For a moment what?"

"When you showed up with that pick, I thought you were planning to kill me." Setterholm hefted the pick, much as Clavain had done earlier. "You wouldn't have done that, would you? I don't deny that what I did was regrettable, but I had to do it."

"I understand."

"But what happens to me now? I can stay with you all, can't I?"

"We probably won't be staying on Diadem, I'm afraid. And I don't think you'd really want to come with us; not if you knew what we're really like."

"You can't leave me alone here, not again."

"Why not? You'll have your worms. And you can always kill yourself again and see who shows up next." Clavain turned to leave.

"No. You can't go now."

"I'll leave your rover on the surface. Maybe there are some supplies in it. Just don't come anywhere near the base again. You won't find a welcome there."

"I'll die out here," Setterholm said.

"Start getting used to it."

He heard Setterholm's feet scuffing across the ice, a walk breaking into a run. Clavain turned around calmly, unsurprised to see Setterholm coming towards him with the pick raised high, as a weapon.

Clavain sighed.

He reached into Setterholm's skull, addressing the webs of machines that still floated in the man's head and instructed them to execute their host in a sudden, painless orgy of neural deconstruction. It was not a trick he could have done an hour ago, but after Galiana had planted the method in his mind, it was as easy as sneezing. For a moment he understood what it must feel like to be a god.

And in that same moment Setterholm dropped the ice pick and stumbled, falling forward onto one end of the pick's blade. It pierced his faceplate, but by then he was dead anyway.

"What I said was the truth," Clavain said. "I might have killed them as well, just like I said. I don't like to think so, but I can't say it isn't in me. No, I don't blame you for that, not at all."

With his boot he began to kick a dusting of frost over the dead man's body. It would be too much bother to remove Setterholm from this place, and the machines inside him would sterilise his body, ensuring that none of his cells ever contaminated the glacier. And, as Clavain had told himself only a few days earlier, there were worse places to die than here. Or worse places to be left for dead, anyway.

When he was done; when what remained of Setterholm was just an ice-covered mound in the middle of the cavern, Clavain addressed him for one final time.

"But that doesn't make it right, either. It was still murder, Setterholm." He kicked a final divot of ice over the corpse. "Someone had to pay for it."