

THE SEEDLING STARS  
James Blish

BOOK ONE - SEEDING PROGRAM

The spaceship resumed humming around Sweeney without his noticing the change. When Capt. Meikiejon's voice finally came again from the wall speaker, Sweeney was still lying buckled to his bunk in a curious state of tranquility he had never known before, and couldn't possibly have described, even to himself. Though he had a pulse, he might otherwise have concluded that he was dead. It took him several minutes to respond.

"Sweeney, do you hear me? Are you all right?"

The brief hesitation in the pilot's breathing made Sweeney grin. From Meikiejon's point of view, and that of most of the rest of humanity, Sweeney was all wrong. He was, in fact, dead.

The heavily insulated cabin, with its own airlock to the outside, and no access for Sweeney at all to the rest of the ship, was a testimonial to his wrongness. So was Meikiejon's tone: the voice of a man addressing, not another human being, but something that had to be kept in a vault.

A vault designed to protect the universe outside it not to protect its contents from the universe.

"Sure, I'm all right," Sweeney said, snapping the buckle and sitting up. He checked the thermometer, which still registered its undeviating minus 194 F. the mean surface temperature of Ganymede, moon number III of Jupiter. "I was- dozing, sort of. What's up?"

"I'm putting the ship into her orbit; we're about a thousand miles up from the satellite now. I thought you might want to take a look."

"Sure enough. Thanks, Mickey."

The wall speaker said, "Yeah. Talk to you later." Sweeney grappled for the guide rail and pulled himself over to the cabin's single bulls-eye port, maneuvering with considerable precision. For a man to whom 1/6 Earth gravity is normal, free fall - a situation of no gravity at all - is only an extreme case.

Which was what Sweeney was, too. A human being - but an extreme case.

He looked out. He knew exactly what he would see; he had studied it exhaustively from photos, from teletapes, from maps, and through telescopes both at home on the Moon and on Mars. When you approach Ganymede at inferior conjunction, as Meikiejon was doing, the first thing that hits you in the eye is the huge oval blot

called Neptune's Trident so named by the earliest Jovian explorers because it was marked with the Greek letter *psi* on the old Howe composite map. The name had turned out to have been well chosen: that blot is a deep, many-pronged sea, largest at the eastern end, which runs from about 120 to 165 in longitude, and from about 10 to 33 North latitude. A sea of what? Oh, water, of course water frozen rock-solid forever, and covered with a layer of rock-dust about three inches thick.

East of the Trident, and running all the way north to the pole, is a great triangular marking called the Gouge, a tom-up, root-entwined, avalanche-shaken valley which continues right around the pole and back up into the other hemisphere, fanning out as it goes. (*Up* because north to space pilots, as to astronomers, is down.) There is nothing quite like the Gouge on any other planet, although at inferior conjunction, when your ship is coming down on Ganymede at the 180 meridian, it is likely to remind you of Syrtis Major on Mars.

There is, however, no real resemblance. Syrtis Major is perhaps the pleasantest land on all of Mars. The Gouge, on the other hand, is - a gouge.

On the eastern rim of this enormous scar, at long. 218, N. lat. 32, is an isolated mountain about 9,000 feet high, which had no name as far as Sweeney knew; it was marked with the letter *pi* on the Howe map. Because of its isolation, it can be seen easily from Earth's Moon in a good telescope when the sunrise terminator lies in that longitude, its peak shining detached in the darkness like a little star. A semicircular shelf juts westward out over the Gouge from the base of Howe's *pi*, it sides bafflingly sheer for a world which shows no other signs of folded strata.

It was on that shelf that the other Adapted Men lived.

Sweeney stared down at the nearly invisible mountain with its star-fire peak for a long time, wondering why he was not reacting. Any appropriate emotion would do: anticipation, alarm, eagerness, anything at all, even fear. For that matter, having been locked up in a safe for over two months should by now have driven him foaming to get out, even if only to join the Adapted Men. Instead, the tranquility persisted. He was unable to summon more than a momentary curiosity over Howe's *pi* before his eye was drawn away to Jupiter himself, looming monstrous and insanely-colored only 600,000 miles away, give or take a few thousand. And even that planet had attracted him only because it was brighter; otherwise, it had no meaning.

"Mickey?" he said, forcing himself to look back down into the

Gouge.

"Right here, Sweeney. How does it look?"

"Oh, like a relief map. That's how they all look. Where are you going to put me down? Don't the orders leave it up to us?"

"Yeah. But I don't think there's any choice," Meikiejon's voice said, less hesitantly. "It'll have to be the big plateau Howe's H."

Sweeney scanned the oval mare with a mild distaste. Standing on that, he would be as conspicuous as if he'd been planted in the middle of the Moon's Mare Crisium. He said so.

"You've no choice," Meikiejon repeated calmly. He burped the rockets several times. Sweeney's weight returned briefly, tried to decide which way it wanted to throw itself, and then went away again. The ship was now in its orbit; but whether Meikiejon had set it up to remain put over its present co-ordinates, or instead it was to cruise criss-cross over the whole face of the satellite, Sweeney couldn't tell, and didn't ask. The less he knew about that, the better.

"Well, it's a long drop," Sweeney said. "And that atmosphere isn't exactly the thickest in the system. I'll have to fall in the lee of the mountain. I don't want to have to trudge a couple of hundred miles over Howe's H."

"On the other hand," Meikiejon said, "if you come down too close, our friends down there will spot your parachute. Maybe it'd be better if we dropped you into the Gouge, after all. There's so much tumbled junk down there that the radar echoes must be tremendous -not a chance of their spotting a little thing like a man on a parachute."

"No, thank you. There's still optical spotting, and a foil parachute looks nothing like a rock spur, even to an Adapted Man. It'll have to be behind the mountain, where I'm in both optical *and* radar shadow at once. Besides, how could I climb out of the Gouge onto the shelf? They didn't plant themselves on the edge of a cliff for nothing."

"That's right," Meikiejon said. "Well, I've got the catapult pointed. I'll suit up and join you on the hull."

"All right. Tell me again just what you're going to do while I'm gone, so I won't find myself blowing the whistle when you're nowhere around." The sound of a suit locker being opened came tinnily over the intercom. Sweeney's chute harness was already strapped on, and getting the respirator and throat-mikes into place would only take a moment. Sweeney needed no other protection.

"I'm to stay up here with all power off except maintenance for 300 days," Meikiejon's voice, sounding more distant now, was

repeating. "Supposedly by that time you'll have worked yourself in good with our friends down there and will know the setup. I stand ready to get a message from you on a fixed frequency. You're to send me only a set of code letters; I feed them into the computer, the comp tells me what to do and I act accordingly. If I don't hear from you after 300 days, I utter a brief but heartfelt prayer and go home. Beyond that, God help me, I don't know a thing."

"That's plenty," Sweeney told him. "Let's go."

Sweeney went out his personal airlock. Like all true interplanetary craft, Meikiejon's ship had no overall hull. She consisted of her essential components, including the personnel globe, held together by a visible framework of girders and I-beams. It was one of the longest of the latter, one which was already pointed toward Howe's H, which would serve as the "catapult."

Sweeney looked up at the globe of the satellite. The old familiar feeling of falling came over him for a moment; he -looked down, reorienting himself to the ship, until it went away. He'd be going in that direction soon enough.

Meikiejon came around the bulge of the personnel globe, sliding his shoes along the metal. In his bulky, misshapen spacesuit, it was he who looked like the unhuman member of the duo.

"Ready?" he said.

Sweeney nodded and lay face down on the I-beam, snapping the guide-clips on his harness into place around it. He could feel Meikiejon's mitts at his back, fastening the JATO unit; he could see nothing now, however, but the wooden sled that would protect his body from the beam.

"Okay," the pilot said. "Good luck, Sweeney."

"Thanks. Count me off, Mickey."

"Coming up on five seconds. Five. Four. Three. Two. One. *Hack.*"

The JATO unit shuddered and dealt Sweeney a nearly paralyzing blow between his shoulder-blades. For an instant the acceleration drove him down into his harness, and the sled spraddled against the metal of the I-beam.

Then, suddenly, the vibration stopped. He was flying free. A little belatedly, he jerked the release ring.

The sled went - curving away from under him, dwindling rapidly among the stars. The pressure at his back cut out as the JATO unit, still under power, flamed ahead of him. The instantly-dissipated flick of heat from its exhaust made him ill for a moment; then it had vanished. It would hit too hard to leave anything where it landed but a hole.

Nothing was left but Sweeney, falling toward Ganymede, head

first.

From almost the beginning, from that day unrememberably early in his childhood when he had first realized that the underground dome on the Moon was all there was to the universe for nobody but himself, Sweeney had wanted to be human; wanted it with a vague, impersonal ache which set quickly into a chill bitterness of manner and outlook at his unique everyday life, and in dreams with flares of searing loneliness which became more infrequent but also more intense as he matured, until such a night would leave him as shaken and mute, sometimes for several days at a stretch, as an escape from a major accident.

The cadre of psychologists, psychiatrists and analysts assigned to him did what they could, but that was not very much. Sweeney's history contained almost nothing that was manipulable by any system of psychotherapy developed to help human beings. Nor were the members of the cadre ever able to agree among themselves what the prime goal of such therapy should be: whether to help Sweeney to live with the facts of his essential inhumanity, or to fan instead that single spark of hope which the non-medical people on the Moon were constantly holding out toward Sweeney as the sole reason for his existence.

The facts were simple and implacable. Sweeney was an Adapted Man - adapted, in this instance, to the bitter cold, the light gravity, and the thin stink of atmosphere which prevailed on Ganymede. The blood that ran in his veins, and the sol substrate of his every cell, was nine-tenths liquid ammonia; his bones were Ice IV; his respiration was a complex hydrogen-to-methane cycle based not upon catalysis by an iron-bearing pigment, but upon the locking and unlocking of a double sulfur bond; and he could survive for weeks, if he had to, upon a diet of rock dust.

He had always been this way. What had made him so had happened to him literally before he had been conceived: the application, to the germ cells which had later united to form him, of an elaborate constellation of techniques-selective mitotic poisoning, pinpoint X-irradiation, tectogenetic microsurgery, competitive metabolic inhibition, and perhaps fifty more whose names he had never even heard - which collectively had been christened "pantropy." The word, freely re-translated, meant "changing everything" and it fitted.

As the pantropists had changed in advance the human pattern in Sweeney's shape and chemistry, so they had changed his education, his world, his thoughts, even his ancestors. You didn't make an Adapted Man with just a wave of the wand, Dr. Alfven had

once explained proudly to Sweeney over the intercom. Even the ultimate germ cells were the emergents of a hundred previous generations, bred one from another before they had passed the zygote stage like one-celled animals, each one biased a little farther toward the cyanide and ice and everything nice that little boys like Sweeney were made of. The psych cadre picked off Dr. Alfvén at the end of that same week, at the regular review of the tapes of what had been said to Sweeney and what he had found to say back, but they need hardly have taken the trouble. Sweeney had never heard a nursery rhyme, any more than he had ever experienced the birth trauma or been exposed to the Oedipus complex. He was a law unto himself, with most of the whereases blank.

He noticed, of course, that Alfvén failed to show up when his next round was due, but this was commonplace. Scientists came and went around the great sealed cavern, always accompanied by the polite and beautifully uniformed private police of the Greater Earth Port Authority, but they rarely lasted very long. Even among the psych cadre there was always a peculiar tension, a furious constraint which erupted periodically into pitched shouting battles. Sweeney never found out what the shouting was about because the sound to the outside was always cut as soon as the quarrels began, but he noticed that some of the participants never showed up again.

"Where's **Dr.** Emory? Isn't this his day?"

"He finished his tour of duty."

"But I want to talk to him. He promised to bring me a book. Won't he be back for a visit?"

"I don't think so, Sweeney. He's retired. Don't worry about him, he'll get along just fine, I'll bring you your book."

It was after the third of these incidents that Sweeney was let out on the surface of the Moon for the first time guarded, it was true, by five men in spacesuits, but Sweeney didn't care. The new freedom seemed enormous to him, and his own suit, only a token compared to what the Port cops had to wear, hardly seemed to exist. It was his first foretaste of the liberty he was to have, if the many hints could be trusted, after his job was done. He could even see the Earth, where people lived.

About the job he knew everything there was to know, and knew it as second nature. It had been drummed into him from his cold and lonely infancy, always with the same command at the end:

"We must have those men back."

Those six words were the reason for Sweeney; they were also Sweeney's sole hope. The Adapted Men had to be recaptured and brought back to Earth or more exactly, back to the dome on the

Moon, the only place besides Ganymede where they could be kept alive. And if they could not all be recaptured - he was to entertain this only as a possibility he must at least come back with Dr. Jacob Rullman. Only Rullman would be sure to know the ultimate secret: how to turn an Adapted Man back into a human being.

Sweeney understood that Rullman and his associates were criminals, but how grievous their crime had been was a question he had never tried to answer for himself. His standards were too sketchy. It was clear from the beginning, however, that the colony on Ganymede had been set up without Earth's sanction, by methods of which Earth did not approve (except for special cases like Sweeney), and that Earth wanted it broken up. Not by force, for Earth wanted to know first what Rullman knew, but by the elaborate artifice which was Sweeney himself.

*We must have those men back.* After that, the hints said never promising anything directly Sweeney could be made human, and know a better freedom than walking the airless surface of the Moon with five guards.

It was usually after one of these hints that one of those suddenly soundless quarrels would break out among the staff. Any man of normal intelligence would have come to suspect that the hints were less than well founded upon any real expectation, and Sweeney's training helped to make him suspicious early; but in the long run he did not care. The hints offered his only hope and he accepted them with hope but without expectation. Besides, the few opening words of such quarrels which he had overheard before the intercom clicked off had suggested that there was more to the disagreement than simple doubt of the convertibility of an Adapted Man.

It had been Emory, for instance, who had burst out unexpectedly and explosively:

"But suppose Rullman was right?"

*Click.*

Right about what? Is a lawbreaker ever "right?" Sweeney could not know. Then there had been the technie who had said "It's the cost that's the trouble with terra-forming" what did that mean? - and had been hustled out of the monitoring chamber on some trumped-up errand hardly a minute later. There were many such instances, but inevitably Sweeney failed to put the fragments together into any pattern. He decided only that they did not bear directly upon his chances of becoming human, and promptly abandoned them in the vast desert of his general ignorance.

In the long run, only the command was real the command and the nightmares. *We must have those men back.*

Those six words were the reason why Sweeney, like a man whose last effort to awaken has failed, was falling head first toward Ganymede.

The Adapted Men found Sweeney halfway up the great col which provided the only access to their cliff-edge colony from the plateau of Howe's H. He did not recognize them; they conformed to none of the photographs he had memorized; but they accepted his story readily enough. And he had not needed to pretend exhaustion - Ganymede's gravity was normal to him, but it had been a long trek and a longer climb.

He was surprised to find, nevertheless, that he had enjoyed it. For the first time in his life he had walked unguarded, either by men or by mechanisms, on a world where he felt physically at home; a world without walls, a world where he was essentially alone. The air was rich and pleasant, the winds came from wherever they chose to blow, the temperature in the col was considerably below what had been allowable in the dome on the Moon, and there was sky all around him, tinged with indigo and speckled with stars that twinkled now and then.

He would have to be careful. It would be all too easy to accept Ganymede as home. He had been warned against that, but somehow he had failed to realize that the danger would be not merely real, but seductive.

The young men took him swiftly the rest of the way to the colony. They had been as incurious as they had been anonymous. Rullman was different. The look of stunned disbelief on the scientist's face, as Sweeney was led into his high-ceilinged, rock-walled office, was so total as to be frightening.

He said: "What's this!"

"We found him climbing the col. We thought he'd gotten lost, but he says he belongs to the parent flight."

"Impossible," Rullman said. "Quite impossible." And then he fell silent, studying the newcomer from crown to toe. The expression of shock dimmed only slightly.

The long scrutiny gave Sweeney time to look back. Rullman was older than his pictures, but that was natural; if anything, he looked a little less marked by age than Sweeney had anticipated. He was spare, partly bald, and slope-shouldered, but the comfortable pod under his belt-line which had shown in the photos was almost gone now. Evidently living on Ganymede had hardened him some. The pictures had failed to prepare Sweeney for the man's eyes: they were as hooded and unsettling as an owl's.



"You'd better tell me who you are," Rullman said at last.

"And how you got here. You aren't one of us, that's certain."

"I'm Donald Leverault Sweeney," Sweeney said. "Maybe I'm not one of you, but my mother said I was. I got here in her ship. She said you'd take me in."

Rullman shook his head. "That's impossible, too. Excuse me, Mr. Sweeney; but you've probably no idea what a bombshell you are. You must be Shirley Leverault's child, then - but how did you get here? How did you survive all this time? Who kept you alive, and tended you, after we left the Moon? And above all, how did you get away from the Port cops? We knew that Port Earth found our Moon lab even before we abandoned it. I can hardly believe that you even exist."

Nevertheless, the scientist's expression of flat incredulity was softening moment by moment. He was, Sweeney judged, already beginning to buy it. And necessarily: there Sweeney stood before him, breathing Ganymede's air, standing easily in Ganymede's gravity, with Ganymede's dust on his cold skin, a fact among inarguable facts.

"The Port cops found the big dome, all right," Sweeney said. "But they never found the little one, the pilot plant. Dad blew up the tunnel between the two before they landed - he was killed in the rock-slide. Of course I was still just a cell in a jug when that happened."

"I see," Rullman said thoughtfully. "We picked up an explosion on our ship's instruments before we took off. But we thought it was the Port raiders beginning to bomb, unexpected though that was. Then they didn't destroy the big lab either, after all?"

"No," Sweeney said. Rullman surely must know that; radio talk between Earth and Moon must be detectable at least occasionally out here. "There were still some intercom lines left through to there; my mother used to spend a lot of time listening in on what was going on. So did I, after I was old enough to understand it. That was how we found out that the Ganymedian colony hadn't been bombed out, either."

"But where did you get your power?"

"Most of it from our own strontium" cell. Everything was shielded so the cops couldn't detect any 'stray fields. When the cell finally began to give out, we had to tap Port's main accumulator line - just for a little bit at first, but the drain kept going up." He shrugged. "Sooner or later they were bound to spot it and di d."

Rullman was momentarily silent, and Sweeney knew that he was doing the pertinent arithmetic in his head, comparing the 20-year

half-life of strontium"" with Sweeney's and the Adapted Men's chronology. The figures would jibe, of course. The Port cops' briefing had been thorough about little details like that.

"It's still quite astounding, having to rethink this whole episode after so many years," Rullman said. "With all due respect, Mr. Sweeney, it's hard to imagine Shirley Leverault going through such an ordeal and all alone, too, except for a child she could never even touch, a child as difficult and technical to tend as an atomic pile. I remember her as a frail, low-spirited girl, trailing along after us listlessly because Robert was in the project." He frowned reminiscently. "She used to say. It's his job.' She never thought of it as anything more than that."

"I was her job," Sweeney said evenly. The Port cops had tried to train him to speak bitterly when he mentioned his mother, but he had never been able to capture the emotion that they wanted him to imitate. He had found, however, that if he rapped out the syllables almost without inflection, they were satisfied with the effect. "You misjudged her. Dr. Rullman - or else she changed after Dad was killed. She had guts enough for ten. And she got paid for it in the end. In the only coin the Port cops know how to pay."

"I'm sorry," Rullman said gently. "But at least you got away. I'm sure that's as she would have wanted it. Where did the ship you spoke of come from?"

"Why, we always had it. It belonged to Dad, I suppose. It was stored in a natural chimney near our dome. When the cops broke into the monitoring room, I went out the other side of the dome, while they were busy with mother, and beat it. There wasn't anything I could have done"

"Of course, of course," Rullman said, his voice low and quiet. "You wouldn't have lasted a second in their air. You did the right thing. Go on."

"Well, I got to the ship and got it off. I didn't have time to save anything but myself. They followed me all the way, but they didn't shoot. I think there's still one of them upstairs now."

"We'll sweep for him, but there's nothing we can do about him in any case except keep him located. You bailed out, I gather."

"Yes. Otherwise I wouldn't have had a chance they seemed to want me back in the worst way. They must have the ship by now, and the coordinates for the colony too."

"Oh, they've had those coordinates since we first landed," Rullman said. "You were lucky, Mr. Sweeney, and bold. too. You bring back a sense of immediacy that I haven't felt for years, since our first escape. But there's one more problem."

"What is it? If I can help"

"There's a test we'll have to make," Rullman said. "Your story seems to hold water; and I really don't see how you could have become what you are, unless you were really one of us. But we have to be certain."

"Sure," Sweeney said. "Let's go."

Rullman beckoned and led him out of the office through a low stone door. The corridor through which they passed was so like all those Sweeney had seen on the Moon that he scarcely bothered to notice it. Even the natural gravity and circulating, unprocessed air were soothing rather than distracting. It was the test that worried Sweeney, precisely because he knew that he would be helpless to affect the outcome. Either the Port Authority's experts had put him together cunningly enough to pass any test, or or he would never have the chance to become human.

Rullman nodded Sweeney through another door into a long, low-ceilinged room furnished with half a dozen laboratory benches and a good deal of glassware. The air was more active here; as on the Moon, there were ventilators roiling it. Someone came around a towering, twisted fractionating apparatus in which many small bubbles orbited, and moved toward them. It was, Sweeney saw, a small glossy-haired girl, with white hands and dark eyes and delicately precise feet. She was wearing the typical technie's white jacket, and a plum-colored skirt.

"Hello, Dr. Rullman. Can I help?"

"Sure, if you can neglect that percolator a while, Mike. I want to run an ID typing; we've got a new man here. All right?"

"Oh, I think so. It'll take a minute to get the sera out." She moved away from them to another desk and began to take out ampoules and shake them before a hooded light. Sweeney watched her. He had seen female techniques before, but none so modelled, so unconstrained, or so close as this. He felt light-headed, and hoped that he would not be asked to speak for a little while. There was sweat on his palms and a mumbling of blood in his inner ear, and he thought perhaps he might cry.

He had been plunged into the midst of his untested, long-delayed adolescence, and he liked it no better than anyone ever had.

But his diamond-etched caution did not blur completely. He remembered-to remember that the girl had been as little surprised to see him as the two young men who had found him climbing the col had been. Why? Surely Dr. Rullman was not the only Adapted Man to know everyone in the colony by sight, and hence the only one able to feel consternation at the sight of a strange face. By this

time, the settlers on Ganymede should know each other's slightest wrinkles, should have committed to memory every gesture, mannerism, dimple, shading, flaw or virtue that would help them to tell each other from the hostile remainder of overwhelming mankind.

The girl took Sweeney's hand, and for a moment the train of thought fell apart completely. Then there was a sharp stab in the tip of his right middle finger, and Mike was expressing droplets of blood into little puddles of bluish solution, spotted in sets of three on a great many slips of thin glass. Microscope slides; Sweeney had seen them before. As for the blood, she could have more if she wanted it.

But he returned doggedly to the question. Why had the young men and Mike failed to be surprised by Sweeney? Was it their age-group that counted? The original colonists of Ganymede would know both each other and their children by sight, while the youngsters to whom everything was essentially new would see nothing strange in a new face.

Children: then the colonists were fertile. There had never been a hint of that, back on the Moon. Of course it meant nothing to Sweeney personally. Not a thing.

"Why, you're trembling," the girl said in a troubled voice. "It was only a little nick. You'd better sit down."

"Of course," Rullman said immediately. "You've been under quite a strain, Mr. Sweeney; forgive me for being so thoughtless. This will be over in just a moment."

Sweeney sat down gratefully and tried to think about nothing. Both the girl and Rullman were now also seated, at the bench, examining with microscopes the little puddles of diluted blood Mike had taken from Sweeney.

"Type O, Rh negative," the girl said. Rullman was taking notes. "MsMs, P negative, cdE/cde, Lutheran a-negative, Kell-Cellano negative, Lewis a-minus b-plus."

"Hmm," Rullman said, unilluminatingly, all as one sound.

"Also Duffy a-negative, Jk-a, U positive. Jay positive, Bradbury-immune, platelets IV, and non-sickling. A pretty clean sweep. Mean anything to you, Mike?"

"It should," she said, looking at Sweeney speculatively. "You want me to match him, then."

Rullman nodded. The girl came to Sweeney's side and the spring-driven lancet went *snick* against another of his fingertips. After she went back to the bench, Sweeney heard the sound again, and saw her brush her own left middle fingertip against a slide. Silence.

"Compatible, Dr. Rullman."

Rullman turned to Sweeney and smiled for the first time.

"You pass," he said. He seemed genuinely glad. "Welcome, Mr. Sweeney. Now if you'll come back to my office, we'll see what we can do about placing you in living quarters, and of course in a job we've plenty of those. Thanks, Mike."

"You're welcome. Goodbye, Mr. Sweeney. It looks like I'll be seeing a lot more of you."

Sweeney nodded and gulped. It was not until he was back in Rullman's office that he could control his voice.

"What was that all about. Dr. Rullman? I mean, I know you were typing my blood, but what did it tell you?"

"It told me your *bona fides*," Rullman said. "Blood groups are inheritable; they follow the Mendelian laws very strictly. Your blood pattern gave me your identity, not as an individual, but as a member of a family. In other words, they showed that you really are what you claim to be, a descendant of Bob Sweeney and Shirley Leverault."

"I see. But you matched me against the girl, too. What did that test?"

"The so-called private factors, the ones that appear only within a family and not in the general population,"-Rullman said. "You see, Mr. Sweeney, as we reckon such matters here, Michaela Leverault is your niece."

## 2

For at least the tenth time in two months, Mike was looking at Sweeney with astonishment, troubled and amused at once.

"Now where," she said, "did you get *that* idea?"

The question, as usual, was dangerous, but Sweeney took his time. Mike knew that he was always slow to answer questions, and sometimes seemed not to hear them at all. The need for such a protective habit was luridly obvious to Sweeney, and he was only postponing the moment when it should become just as obvious to the Ganymedians; only the plainly pathological introversion of his character as a whole had excused him even thus far from a suspicion that he was ducking the hard ones.

Sooner or later, Sweeney was sure, that suspicion would arise. Sweeney had had no experience of women, but he was nevertheless convinced that Mike was an exceptional sample.

Her quickness of penetration sometimes seemed close to telepathy. He mulled the question, leaning on the railing around the hedge below the mountain, looking reflectively into the Gouge,

constructing his answer. Each day he had to shorten that mulling-time, though the questions grew no less difficult for his pains.

"From the Fort cops," he said. "I've got only two answers to that question, Mike. Anything I didn't get from my mother, I got from spying on the cops."

Mike, too, looked down into the mists of the Gouge. It was a warm summer day, and a long one - three and a half Earth days long, while the satellite was on the sunward side of Jupiter, and coming, with Jupiter, closer and closer to the sun.

The wind which blew over the flute-mouthpiece of rock on this side of the mountain was as gentle and variable as a flautist's breath, and did not stir the enormous tangled stolons and runners which filled the bottom of the great valley, or the wrap-around leaves which were plastered to them like so many thousands of blue-green Mobius-strips.

It was not quiet down there, but it seemed quiet. There were many more thrums and rummums of rolling rocks and distant avalanches than one heard during the cold weather. The granite-skinned roots were growing rapidly while their short time was come, burrowing insistently into the walls of the valley, starting new trees and new rocks. In the cliffs, the warm weather changed water-of-crystallization from Ice IV to Ice III, the bound water snapping suddenly from one volume to another, breaking the rock strata apart. Sweeney knew how that worked; that was exfoliation; it was common on the Moon, though on the Moon it was caused by the re-freezing of Ice I in the gypsum strata. But the end-result was the same: rock-slides.

All these incessant erratic rumbles and muted thunders were the sounds of high summer in the Gouge. They were as peaceful to Sweeney's ears as bee-buzz is to an Earthman, though Sweeney had never encountered bee-buzz except in books. And like growing things everywhere, the terrific gnarled creepers down below sent up into the Adapted Men's air a fresh complacent odor, the specific smell of vegetable battle-unto-death which kills animal nostrils and animal glands into forgetting past struggles of their own.

Ganymede was, as a matter of fact, a delightful world, even for a dead man. Or solely for a dead man.

"I can't understand why the Port cops would waste time batting lies back and forth," Mike said at last. "*They* know we weren't doing any commerce-raiding. We've never been so much as off Ganymede since we landed here. And we couldn't get off if we wanted to, now. Why should they pretend that we did? Why would they talk about it as if it was a fact, especially since they didn't know you were

listening? It's senseless."

"I don't know," Sweeney said. "It never entered my head that you *weren't* commerce-raiding. If I'd had any notion that they weren't telling the truth. I'd have listened for clues to tell me why they weren't. But it never entered my head. And now it's too late; all I can do is guess."

"You must have heard something. Something you don't remember consciously. I can guess, too, but it's your guess that's important. You were listening to them; I wasn't. Try, Don."

"Well," Sweeney said, "maybe they didn't know that what they were saying was untrue. There's no law that says a Port cop has to be told the truth by his bosses. They're back on Earth; I was on the Moon, and so were they. And they sounded pretty convinced; the subject kept coming up, all the time, just casually, as if everybody knew about it. They all believed that Ganymede was raiding passenger liners as far m as the orbit of Mars. It was a settled fact. That's how I heard it."

"That fits," Mike said. Nevertheless, she was not looking at Sweeney; instead, she bent her head farther down over the rim of the Gouge, her hands locked together before her in dim space, until her small breasts were resting lightly on the railing. Sweeney took a long breath. The effluvium of the vines suddenly seemed anything but lulling.

"Tell me, Don," she said. "When did you hear the cops begin to talk this subject up? For the first time, I mean?"

His veering attention snapped back into the frigid center of his being so suddenly that it left behind a bright weal, as if a lash had been laid across his exposed brain. Mike was dangerous; dangerous. He had to remember that.

"When?" he said. "I don't know, Mike. The days were all alike. It was toward the end, I think. When I was a kid I used to hear them talk about us as if we were criminals, but I couldn't figure out why. I guessed that it was because we were different, that's all. It was only at the end that they began to talk about specific crimes, and even then it didn't make much sense to me. My mother and I hadn't ever pirated any 'ships, that was for sure."

"Only at the last. That's what I thought. They began to talk like that for the first time when your power began to fail. Isn't that right?"

Sweeney gave that one a long think, at least 'twice as long as would ordinarily have been safe before Mike. He already knew where Mike's questions were leading him. In this instance, a quick answer would be fatal. He had to appear to be attempting, with

some pain, to dredge up information which was meaningless to him. After a while, he said:

"Yes, it was about then. I was beginning to cut down on tapping their calls; it didn't take much power, but we needed all we had. Maybe I missed hearing the important parts; that's possible."

"No," Mike said grimly. "I think you heard all of it. Or all you were meant to hear. And I think you interpreted what you heard in exactly the way they wanted you to, Don."

"It could be," Sweeney said slowly. "I was-only a kid. I would have taken what I heard at face value. But that would mean that they knew we were there. I wonder. I don't remember exactly, but I don't think we had begun to sneak power from them yet. We were still thinking about putting a sun-cell on the surface, in those days."

"No, no. They must have known you were there years before you began to tap their power. Rullman's been talking about that lately. There are simple ways of detecting even a phone-line tap, and your strontium battery couldn't have been undetected very long, either. They waited only until they could be sure they'd get you when they finally raided you. It's the way they think. In the meantime, they fed you hokum when you eavesdropped."

So much for the story the cops had told Sweeney to tell. Only the extreme of stupidity which it assumed in the Adapted Men had protected it this long; nobody defends himself, at least at first, upon the assumption that his opponent thinks he is a microcephalic idiot. The deception had lasted two months, but it would never last 300 days.

"Why would they do that?" Sweeney said. "They were going to kill us as soon as they could - as soon as they could work out a way to do it without damaging our equipment. What did they care what we thought?"

"Torture," Mike said, straightening and locking her hands around the railing with the automatic tetany of a bird's claws touching a perch. She looked across the Gouge at the distant, heaped range on the other side. "They wanted you to think that everything your people had planned and done had come to nothing - that we had wound up as nothing but vicious criminals. Since they couldn't get to you and your mother immediately, they amused themselves with strafing you while they worked. Maybe they thought it'd help soften you *up* goad you into making some mistake that would make the job of getting in to you easier. Or maybe they did it just because they enjoyed it. Because it made them feel good."

After a short silence, Sweeney said, "Maybe that was it. Maybe



not. I don't know, Mike."

She turned to him suddenly and took him by the shoulders. Her eyes were crystal blue. "How could you know?" she said, her fingers digging into his deltoid muscles. "How could you know *anything* when there was nobody to tell you? The Earth must be full of lies about us now - lies, and nothing but lies! You've got to forget them - forget them all - just as though you'd just been born. You *have* just been born, Don, believe me. Only just. What they fed you on the Moon was lies; you've got to start learning the truth here, learning it from the beginning, like a child!"

She held him a moment longer. She was actually shaking him. Sweeney did not know what to say; he did not even know what emotion to mimic. The emotion he felt was still almost unknown; he did not dare let it show, let alone let it loose. While the girl looked furiously into his eyes, he could not even blink.

After all, he really had been born some time ago. Born dead.

The painful, tenfold pressure on his shoulders changed suddenly to a residual tingling over a deep ache, and Mike's hands dropped to her sides. She looked away, across the Gouge again. "It's no use," she said indistinctly. "I'm sorry. That's a hell of a way for a girl to talk to her uncle."

"That's all right, Mike. I was interested."

"I'm sure of it. . . . Let's go for a walk, Don. I'm sick of looking into the Gouge." She was already striding back toward the looming mountain under which the colony lived. Sweeney watched her go, his icy blood sighing in his ears. It was terrible to be unable to think; he had never known the dizziness of it until he had met Mike Leverault, but now it seemed determined never to leave him - it abated sometimes, but it never quite went away. He had been ruefully glad, at the very beginning, that the close "blood" tie between himself and Mike, a genetic tie which was quite real since he was in fact Shirley Leverault's Adapted son, would prevent his becoming interested in the girl in accordance with Earth custom.

But in fact it had had no such effect. Earth tabus had no force for him, and here on Ganymede, that particular tabu had been jettisoned summarily. Rullman had told him why.

"Don't give it a second thought," he had said on that very first day, grinning into Sweeney's stunned face. "We haven't any genetic reasons for forbidding inbreeding; quite the contrary. In a small group like ours, the strongest and most immediate evolutionary influence is genetic drift. Unless we took steps to prevent it, there'd be a loss of unfixated genes with every new generation. Obviously we can't allow that, or we'd wind up with a group in which there'd be

no real individuals: everybody would be alike in some crucial and absolutely unpredictable respect. No tabu is worth that kind of outcome."

Rullman had gone on from there. He had said that simply permitting inbreeding could not in itself halt genetic drift; that in some respects it encouraged it; and that the colony was taking positive measures to circumvent drift, measures which would begin to bear fruit within eight generations. He had begun by this time to talk in terms of alleles and isomorphs and lethal recessives, and to scribble such cryptograms as  $rrR:rRR/(rA)rr/R'Rr$  on the sheet of mica before him; and then, suddenly, he had looked up and realized that he had lost his audience. That, too, had amused him.

Sweeney had not minded. He knew he was ignorant. Besides, the colony's plans meant nothing to him; he was on Ganymede to bring the colony to an end. As far as Mike was concerned, he knew that nothing would govern him but his monumental loneliness, as it governed everything else that he did and felt.

But he had been astonished to discover that, covertly at least, that same loneliness governed everyone else in the colony, with the sole possible exception of Rullman.

Mike looked back, and then, her face hardening, quickened her pace. Sweeney followed, as he knew he had to; but he was still struggling to think.

Much of what he had learned about the colony, if it was true - and at least everything he had been able to check had passed that test - had involved his unlearning what he had been taught by the Port cops. The cops, for instance, had said that the alleged commerce-raiding had had two purposes: secondarily to replenish food and equipment, but primarily to augment the colonists' numbers by capturing normal people for Adaptation.

There was no commerce-raiding going on now, that much was certain, and Sweeney was inclined to believe Mike's denial that there had ever been any in the past. Once one understood the ballistics of space-travel, one understood also that piracy is an impossible undertaking, simply because it is more work than it is worth. But beyond this persuasive practical objection, there was the impossibility of the motive the Port cops had imputed to the Ganymedians. The primary purpose was nonsense. The colonists were fertile, and hence did not need recruits; and besides, it was impossible to convert a normal adult human being into an Adapted Manpantropy had to begin before conception, as it had been begun with Sweeney.

Calamitously, the reverse also appeared to be true. Sweeney had

been unable to find anybody in the colony who believed it possible to convert an Adapted Man back into a human being. The promise the Port cops had held out to him - though they had never made it directly - thus far appeared to be founded upon nothing better than dust. If it were nevertheless possible to bring a man like Sweeney back to life, only Rullman knew about it, and Sweeney had to be hypercautious in questioning Rullman. The scientist had already made some uncomfortable deductions from the sparse facts and ample lies with which Sweeney had, by order of the Port cops, provided him. Like everyone else on Ganymede, Sweeney had learned to respect the determination and courage which were bodied forth in everything Rullman did and said; but unlike anybody else on Ganymede, he feared Rullman's understanding.

And in the meantime - while Sweeney waited, with a fatalism disturbed only by Mike Leverault, for Rullman to see through him to the other side of the gouge which was Sweeney's frigid tangled substitute for a human soul - there remained the question of the crime.

*We must have those men back. Why? Because we need to know what they know. Why not ask them? They won't tell us. Why not? Because they're afraid. What of? They committed a crime and must be punished. What did they do?*

SILENCE

So the question of the crime still remained. It had not been commerce-raiding; even had the Ganymedians achieved the impossible and had pirated spacecraft, that would not have been the *first* crime, the one which had made the Adapted Men flee to Ganymede in the first place, the crime from which the whole technique of pantropy had sprung. What high crime had the parents of the Adapted Men committed, to force them to maroon their children on Ganymede for what they must have believed was to be forever?

The responsibility was not the children's, that much was also obvious. The children had never been on the Earth at all. They had been born and raised on the Moon, in strict secrecy. The cops' pretense that the colonists themselves were wanted back for some old evil was another fraud, like the story about commerce-raiding. If a crime had been committed on Earth, it had been committed by the normal Earthmen whose frigid children roamed Ganymede now; it could have been committed by no-one else.

Except, of course, by Rullman. Both on the Moon and on Ganymede it was the common assumption that Rullman had been an Earth-normal human being once. That was impossible, but it

was agreed to be so. Rullman himself turned the question away rather than deny it. Perhaps the crime had been his alone, since there was nobody else who could have committed it.

But *what* crime? Nobody on Ganymede could, or would, tell Sweeney. None of the colonists believed in it. Most of them thought that nothing was held against them but their difference from normal human beings; the exceptional few thought that the development of pantropy itself was the essential crime. Of that, clearly, Rullman was guilty, if "guilty" was the applicable word.

Why pantropy, or the responsibility for developing it, should be considered criminal was a mystery to Sweeney, but there was a great deal else that he didn't know about Earth laws and standards, so he wasted no more time in puzzling over it. If Earth said that inventing or using pantropy was a crime, that was what it was; and the Port cops had already told him that he must not fail to bring back Rullman, no matter how grievously he failed to fulfill all his other instructions. It was an answer, and that was enough.

But why hadn't the cops said so in the first place? And why, if pantropy was a crime, had the cops themselves compounded that identical crime - by creating Sweeney?

Belatedly, he quickened his pace. Mike had already disappeared under the lowering brow of the great cavern. He could not remember noticing, now, which of the dozen smaller entrances she had used, and he himself did not know where more than two of them led. He chose one at random.

Four turns later, he was hopelessly lost.

This was unusual, but it was not entirely unexpected. The network of tunnels under Howe's *pi* was a labyrinth, not only in fact but by intention. In drilling out their home, the Adapted Men had taken into consideration the possibility that gun-carrying men in spacesuits might some day come looking for them. Such a man would never find his way out from under the mountain, unless an Adapted Man who had memorized the maze led him out; and he would never find an Adapted Man, either. Memorization was the only key, for no maps of the maze existed, and the colonists had a strictly enforced law against drawing one.

Sweeney had perhaps half of the maze committed to memory. If he did not meet someone he knew - for after all, nobody was hiding from *him* - he could count upon entering a familiar section sooner or later. In the meantime, he was curious to see anything that there was to be seen.

The first thing of interest that he saw was Dr. Rullman. The scientist emerged from a tunnel set at a 20 angle to the one

Sweeney was in at the moment, going away from Sweeney and unaware of him. After an instant's hesitation, Sweeney followed him, as silently as possible. The noisy ventilation system helped to cover his footfalls.

Rullman had a habit of vanishing for periods ranging from half a day to a week. Anybody who knew where he went and what he did there did not talk about it. Now was a chance, perhaps, for Sweeney to find out for himself. It was possible, of course, that Rullman's disappearances were related to the forthcoming meteorological crisis on Ganymede, about which Sweeney had been hearing an increasing number of hints. On the other hand . . . what was on the other hand? There could be no harm in investigating.

Rullman walked rapidly, his chin ducked into his chest, as though he were travelling a route so familiar that habit could be entrusted with carrying him along it. Once Sweeney almost lost him, and thereafter cautiously closed up the interval between them a little; the labyrinth was sufficiently complex to offer plenty of quick refuges should Rullman show signs of turning back. As the scientist moved, there came from him an unpredictable but patterned series of wordless sounds, intoned rather than spoken. They communicated nothing, actuated no mechanisms, gave Rullman no safe-conduct - as was evidenced by the fact that Sweeney was travelling the same course without making any such noise. Indeed, Rullman himself seemed to be unaware that he was making it.

Sweeney was puzzled. He had never heard anybody hum before.

The rock beneath Sweeney's feet began to slope downward, gently but definitely. At the same time, he noticed that the air was markedly warmer, and was becoming more so with almost every step. A dim sound of laboring machinery was pulsing in it.

It got hotter, and still hotter, but Rullman did not hesitate. The noise - which Sweeney could now identify definitely as that of pumps, many of them - also increased. The two men were now walking down a long, straight corridor, bordered by closed doors rather than maze exits; it was badly lit, but Sweeney nevertheless allowed Rullman to get farther ahead of him. Toward the other end of this corridor, the heat began to diminish, to Sweeney's relief, for he had begun to feel quite dizzy. Rullman gave no indication that he even noticed it.

At this end Rullman ducked abruptly into a side entrance which turned out to be the top of a flight of stone steps. Quite a perceptible draft of warm air was blowing down it.

Warm air, Sweeney knew, was supposed to rise in a gravitational

field; why it should be going in the opposite direction he could not imagine, especially since there appeared to be no blowers in operation on this level. Since it was blowing toward Rullman, it would also carry any noise Sweeney made ahead of him. He tiptoed cautiously down.

Rullman was not in sight when Sweeney left the stairwell. There was before Sweeney, instead, a long, high-ceilinged passageway which curved gently to the right until vision was cut off. Along the inside of the curve, regularly spaced, were crouching machines, each one with a bank of laterally-coiled metal tubing rearing before it. These were the sources of the sounds Sweeney had heard.

Here, it was cold again; abnormally cold, despite the heavy current of warm air blowing down the stairwell. Something, Sweeney thought, was radically wrong with the behaviour of the thermodynamic laws down here.

He slouched cautiously ahead. After only a few steps, past the first of the laboring mechanisms - yes, it was coldest by the shining coils, as if cold were actually radiating from them he found an undeniable airlock. Furthermore, it was in use: the outer door was sealed, but a little light beside it said that the lock was cycling. Opposite the lock, on the other wall, one of a row of spacesuit lockers hung open and tenantless. But it was the legend painted on the airlock valve which finally made everything fall into place. It said:

PANTROPE LABORATORY ONE

*Danger Keep Out!*

Sweeney dodged away from the airlock with a flash of pure panic, as a man wanted for murder might jump upon seeing a sign saying "50,000 volts." It was all clear now. There was nothing wrong with the thermodynamics of this corridor that was not similarly "wrong" inside any refrigerator. The huge engines were pumps, all right - heat pumps. Their coils were frost-free only because there was no water vapor in Ganymede's air; nevertheless, they were taking heat from that air and transferring it to the other side of that rock wall, into the pantrobe lab.

No wonder the laboratory was sealed off from the rest of the maze by an airlock - and that Rullman had had to put on a spacesuit to go through it. It was hot on the other side. Too hot for an Adapted Man. But *what* Adapted Man?

What good was pantropy to Rullman here? That phase of history was supposed to be over and done with. Yet what was going on in this laboratory obviously was as alien to the environment of Ganymede as Ganymede's environment was to Earth's.

A is to B as B is to - what? To C? Or to A?

Was Rullman, in the face of the impossibility of such a project, *trying to re-adapt his people to Earth?*

There should be dials or meters on this side of the wall which would give more information as to what it was like on the other side. And there they were, in a little hooded embrasure which Sweeney had overlooked in the first shock. They said:

r 59  
Degrees F.  
— 

0614
0030

  
Millibars

047                      0140  
Dew Point              02 Tens mm Hg

Some of these meant nothing to Sweeney: he had never before encountered pressure expressed in millibars, let alone the shorthand way it was registered on the meter before him; nor did he know how to compute relative humidity from the dew point. With the Fahrenheit scale he was vaguely familiar, vaguely enough to have forgotten how to convert it into Centigrade readings. But

*Oxygen tension!*

There was one planet, and one only, where such a measurement could have any meaning.

Sweeney ran.

He was no longer running by the time he had reached Rullman's office, although he was still thoroughly out of breath. Knowing that he would be unable to cross back over the top of the pantrope lab again, feeling that heat beating up at him and knowing at least in part what it meant, he had gone in the opposite direction, past the gigantic heat-exchangers, and blundered his way up from the other side. The route he had followed had covered over three erratic miles, and several additional discoveries which had shaken him almost as hard as had the first one.

He was entirely unsure that he was even rational any more. But he had to know. Nothing was important to him now but the answer to the main question, the permanent founding or dashing of the hope under which he had lived so long.

Rullman was already back in the office, almost surrounded by his staff. Sweeney pushed his way forward among the Ganymedians, his jaw set, his diaphragm laboring.

"This time we're going to close all the safety doors," Rullman said into the phone. "The pressure fronts are going to be too steep to allow us to rely on the outside locks alone. See to it that everybody knows where he's to be as soon as the alert sounds, and this time make it stick; we don't want anybody trapped between doors for the duration. This time it may swoop down on us at damn short notice."

The phone murmured and cut out.

"Hallam, how's the harvesting? You've got less than a week, you know."

"Yes, **Dr.** Rullman - we'll be through in time."

"And another thing - oh, hello, Donald. What's the matter? You're looking a little pasty. I'm pretty busy, so make it fast, please."

"I'll make it fast," Sweeney said. "I can put it all into one question if I can talk to you privately. For just a few seconds,"

Rullman's reddish eyebrows went up, but after examining Sweeney's face more closely, the scientist nodded and rose.

"Come next door, then... Now then, youngster, spit it out. With the storm coming up, we don't have time for shilly-shallying."

"All right," Sweeney said, taking a long breath. "This is it: Is it possible to change an Adapted Man back into a human being? An Earth-normal human being?"

Rullman's eyes narrowed very slowly; and for what seemed a long time, he said nothing. Sweeney looked back. He was afraid, but he was no longer afraid of Rullman.

"You've been down below, I see," the scientist said at last, drumming at the base of his chin with two fingers. "And from the terms you use, it strikes me that Shirley Leverault's educational methods left - well, the cliché springs to mind something to be desired. But we'll let those things pass for now.

"The answer to your question, in any case, is: *No*. You will never be able to live a normal life in any other place than Ganymede, Donald. And I'll tell you something else that your mother should have told you: You ought to be damned glad of it."

"Why should I?" Sweeney said, almost emotionlessly.

"Because, like every other person in this colony, you have a Jay-positive blood type. This wasn't concealed from you when we found it, on the first day you joined us, but evidently it didn't register - or had no special significance for you. Jay-positive blood doesn't mean anything on Ganymede, true enough. *But Jay-positive Earth-normal people are cancer-prone*. They are as susceptible to cancer as hemophiliacs are to bleeding to death - and upon equally short



notice.

"If by some miracle you *should* be changed to an Earth-normal man, Donald, you would be under immediate sentence of death. So I say you should be glad that it can't happen - damn glad!"

### 3

The crisis on Ganymede - though of course it would not even be an incident, were there nobody there to live through it comes to fruition roughly every eleven years and nine months. It is at the end of this period that Jupiter - and hence his fifteen-fold family of moons and moonlets - makes his closest approach to the Sun.

The eccentricity of Jupiter's orbit is only 0.0484, which amounts to very little for an ellipse which averages 483,300,000 miles from its focal points. Nevertheless, at perihelion Jupiter is nearly ten million miles closer to the Sun than he is at aphelion; and the weather on Jupiter, never anything less than hellish, becomes indescribable during that approach. So, on a smaller but sufficient scale, does the weather on Ganymede.

The perihelion temperature on Ganymede never rises high enough to melt the ice of Neptune's Trident, but it does lift through the few niggardly degrees necessary to make the vapor pressure of Ice III known in Ganymede's air. Nobody on Earth could dream of calling the resulting condition "humidity," but Ganymede's weather turns upon such microscopic changes; an atmosphere containing *no* water will react rapidly to even a fractional vapor content. For one thing, it will pick up more heat. The resulting cycle does not go through more than a few turns before it flattens out, but the end-product is no less vicious.

The colony, Sweeney gathered, had come through one such period without any but minor difficulties, simply by withdrawing entirely under the mountain; but for many reasons that course was no longer possible. There were now semi-permanent installations - weather stations, observatories, radio beacons, bench-marks and other surveying monuments - which could be dismantled only with the loss of much time before the crisis, and re-established with still more loss afterwards. Furthermore, some of them would be needed to report and record the progress of the crisis itself, and hence had to stay where they were.

"And don't get the idea," Rullman told a mass meeting of the colonists, gathered, in the biggest cavern of the maze, "that even the mountain can protect us all the way through this one. I've told you before, but I'll remind you again, that the climax this year coincides

with the peak of the sunspot cycle. Everybody's seen what that does to the weather on Jupiter proper. We can expect similar effects, to scale, on Ganymede. There's going to be trouble no matter how well we prepare. All we can hope for is that the inevitable damage will be minor. Anybody who thinks we're going to get off scot-free has only to listen for a minute."

In the calculated, dramatic pause which followed, everybody listened. The wind was audible even down here, howling over the outlets and intakes of the ventilation system, carried, amplified and encrusted with innumerable echoes, by the metal miles of the air ducts. The noise was a reminder that, at the height of the coming storm, the exterior ports would all be closed, so that everyone under the mountain would have to breathe recirculated air. After a moment, a mass sigh - an involuntary intake of breath against 'the easily imagined future - passed through Rullman's audience. He grinned. *beginnen*

"I don't mean to frighten you," he said. "We'll get along.

But I don't want any complacency either, and above all, I won't stand for any sloppiness in the preparations. It's particularly important that we keep the outside installations intact this time, because we're going to need them before the end of .the next Jovian yeara long time before that, if everything continues to go well."

The grin was suddenly quenched. "I don't need to tell some of you how important it is that we get that project completed on schedule," Rullman said, quietly. "We may not have much time left before the Port cops decide to move in on usit amazes me that they haven't already done so, particularly since we're harboring a fugitive the cops troubled to chase almost into our atmosphereand we can't plan on their giving us any leeway.

"For those of you who know about the project only in outline, let me emphasize that there is a good deal more hanging from it than immediately meets the eye. Man's whole future in space may be determined by how well we carry it off; we can't afford to be lickedneither by the Earth nor by the weather. If we are, our whole long struggle for survival will have been meaningless. I'm counting on everyone here to see to it that that doesn't happen."

It was difficult to be sure of what Rullman was talking about when he got onto the subject of the "project." It had something to do with the pantrope labs, that much was clear; and it bad to do also with the colony's original spaceship,

which Sweeney had run across that same day, stored in a launching chimney almost identical with the one on the Moon out of which Sweeney had been rocketed to begin his own free life, and fitted if judgment based upon a single brief look could be trusted either for a long voyage by a few people, or for a short trip by a large group.

Beyond that, Sweeney knew nothing about the "project," except for one additional fact of which he could make nothing: it had something to do with the colony's long-term arrangements for circumventing the loss of unfixed penes. Possibly nobody would be less able to assess the possibility than Sweeney the only connection this fact had with the "project" was that it was long-term.

Sweeney, in any event, knew better than to ask questions. The storm that was going on inside him took precedence, anyhow; as far as he was concerned, it was even more important than the storms that were sweeping Ganymede, or any that might sweep that world in the foreseeable future. He was not used to thinking in terms of a society, even a small one; Pullman's appeals to that Ideal were simply incomprehensible to him. He was the solar system's most thorough-going individualist not by nature, but by design.

Perhaps Pullman sensed it. Whether he did or not, the assignment he gave Sweeney might have been perfectly calculated to throw a lonely man into the ultimate isolation he feared; to put the burden of an agonizing decision entirely upon the shoulders of the man who had to carry it; or to isolate a Port spy where he could do the least harm while the colony's attention was fully occupied elsewhere. Or possibly, even probably, he had none of these motives in mind; what counted, in any event, was what he did.

He assigned Sweeney to the South polar weather station, for the duration of the emergency.'

There was almost nothing to do there but watch the crystals of methane "snow" bank against the windows, and keep the station tight. The instruments reported back to base by themselves, and needed no further attention. At the height of the crisis, perhaps, Sweeney might find himself busy for a while; or, he might not. That remained to be seen.

In the meantime, he had plenty of time to ask questions and nobody to ask them of but himself, and the hooting, constantly rising wind.

There was an interlude. Sweeney hiked, on foot, back to

Howe's H to recover the radio transceiver he had buried there, and then hiked back to the weather station. It took him eleven days, and efforts and privations of which Jack London might have made a whole novel. To Sweeney it meant nothing; he did not know whether or not he would want to use the radio after he got back with it; and as for the saga of his solo journey, he did not know that it was a saga, or even that it had been unusually difficult and painful. He had nothing against which to compare it, not even fiction; he had never read any. He measured things by the changes they made in his situation, and possession of the radio had not changed the questions he was asking himself; it had only made it possible to act upon the answers, once he had any answers.

Coming back to the station, he saw a pinnah-bird. It burrowed into the nearest drift as soon as it saw him, but for the preceding instant he had had company. He never saw it again, but now and then he thought about it.

The question, put simply, was: What was he going to do now? That he was thoroughly in love with Mike Leverault could no longer be argued. It was doubly difficult to come to grips with the emotion, however, because he did not know the name of it, and so had to reason each time with the raw experience itself, rather than with the more convenient symbol. Each time he thought about it, it shook him all over again. But there it was.

As for the colonists, he was certain that they were not criminals in any way, except by Earth's arbitrary fiat. They were a hard-working, courageous, decent lot, and had offered to Sweeney the first disinterested friendliness he had ever known.

And, like all the colonists, Sweeney could not help but admire RuUman.

There, in those three propositions, rested the case against using the radio.

The time for reporting to Meikiejon was almost up. The inert transceiver on the table before Sweeney had only to send a single one of five notes, and the colony on Ganymede would be ended. The notes were coded: -

WAVVY: *Have custody need pickup*

NAVVY: *Have custody need help*

WANY: *Need custody have help*

AAVYV: *Need custody need pickup*

YYAWY: *Have custody have pickup*

What response the computer on board the ship would make, what course of action it would dictate in response to any one of those signals was unknown, but that was now almost beside the point. Any response would be inappropriate, since not one of the five signals fitted the actual situation despite all the intellectual travail which had gone into tailoring them. If no note were sent, Meikiejon would go away at the end of 300 days. That might mean that Pullman's "project," whatever that was, would go through but that wouldn't save the colony. It would take Earth a minimum of two generations to breed and mature another Sweeney from the artificially maintained ovaries of mercifully long-dead Shirley Leverault, and it was hardly likely that Earth would even try. Earth probably knew more than Sweeney did about the "project" it would be difficult to know less and if Sweeney himself failed to stop it, the next attempt would most likely arrive as a bomb. Earth would stop wanting "those men" back, once it became evident that she couldn't get them even through so subtle a double agent as Sweeney.

Item: chain reaction. There was, Sweeney knew, a considerable amount of deuterium on Ganymede, some of it locked in the icy wastes of Neptune's Trident, a lesser amount scattered through the rocks in the form of lithium deuteride. A fission bomb going off here would stand an excellent chance of starting a fusion explosion which would detonate the whole satellite. If any still-active fragment of that explosion should hit Jupiter, only a bare 665,000 miles away now, that planet would be quite large enough to sustain a Beth- or carbon cycle; it was diffuse, but it alone among the planets had the mass. The wave front of *that* unimaginable catastrophe would boil Earth's seas in their beds; it might also the probability was about  $\sim 10^{-10}$  -triggerr a nova outburst from the Sun, though nobody would stay alive to be grateful very long if it didn't.

Since Sweeney knew this, he had to assume that it was common knowledge, and that Earth would use chemical explosives only on Ganymede. But would it? Common knowledge and Sweeney had had precious little contact so far.

Still, it hardly mattered. If Earth bombed the colony, it would be all up with him, regardless. Even the limited companionship, the wordless love, the sense that he might yet be born, all would be gone. He would be gone. So might the little world.

But if he signalled Meikiejon and the computer, he would be taken alive away from Mike, away from RuUman, away from the colony, away and away. He would stay his own dead self. He might even have a new chance to learn that same endless lesson about the shapes loneliness can take; or, Earth might work a miracle and turn him into a live, Jay-positive human being.

The wind rose and rose. The congruent furies of the storms inside and outside Sweeney mounted together. Their congruence made a classic example, had he been able to recognize it, of the literary device called "the pathetic fallacy" but Sweeney had never read any fiction, and recognizing nature in the process of imitating art would have been of no use to him anyhow.

He did not even know that, when the crisis of the exterior storm began to wear away the windward edge of the weather station's foundations with a million teeth of invisible wrath, his lonely battle to save the station might have made an epic. Whole chapters, whole cantos, whole acts of what might have been conscious heroism in another man, in a human being, were thrown away while Sweeney went about his business, his mind on his lonely debate.

There was no signal he could send that would tell Meikiejon or the computer the truth. He did not have custody of the men Earth wanted, and he didn't want to have it, so it would be idiotic to ask for help to get it. He no longer believed that Earth "must have those men back," either for Earth's purposes mysterious though they remained or for his own, essentially hopeless though his own appeared to be.

But any signal would take him off Ganymede if he wanted to be taken.

The crisis, he saw, was over. He made the station fast. He checked the radio once more. It worked. He snapped the turning pointer to one of its copper contacts and closed the key, sending Meikiejon VVANY. After half an hour, the set's oscillator began to peep rhythmically, indicating that Meikiejon was still in Ganymede's sky, and had heard. Sweeney left the set on the table in the station, went back to the mountain, and told Rullman what he was and what he had done.

Rullman's fury was completely quiet, and a thousand times more frightening than the most uncontrolled rage could have been. He simply sat behind his desk and looked at Sweeney,

all the kindness gone out of his face, and the warmth out of his eyes. After a few moments, Sweeney realized that the blankness of Rullman's eyes meant that he was not seeing him at all; his mind was turned inward. So was his rage. "I'm astonished," he said, in a voice so even that it seemed to contain no surprise at all. "Most of all, I'm astonished at myself. I should have anticipated something like this. But I didn't dream that they had the knowledge, or the guile, to stake everything on a -long-term program like this. I have been, in short, an idiot."

His voice took on, for a moment, a shade of color, but it was so scathing that it made Sweeney recoil. And yet no single word of condemnation of Sweeney had yet been forthcoming from Rullman; the man was, instead, strafing himself. Sweeney said tentatively:

"How could you have known? There were a lot of points where I might have given myself away, but I was doing my damndest not to. *I* might have kept the secret still longer, if I'd wanted it that way."

"You?" Rullman said. The single syllable was worse than a blow. "You're as blameless as a machine, Donald. I know too much about pantropy to think otherwise. It's very easy to isolate an Adapted infant, prevent him from becoming a human being at all, if you've sufficient ill-will to want to. Your behavior was predictable, after all."

"Was it?" Sweeney said, a little grimly. "I came and told you, didn't I?"

"And what if you did? Can that change matters now? I'm sure that Earth included that very high probability in its plans. Insofar as you have loyalties at all, they were bound to become divided; but it was probably calculated that they would stay divided—that is, would not change completely. And so here you are, trying to play both ends against the middle—you yourself being the middle—by betraying your masquerade to me at the same time you betray the colony to Earth. Nothing can be accomplished by that."

"Are you sure?"

"Quite sure," Rullman said stonily. "I suppose they offered you an inducement. Judging by the questions you've asked me before, they must have promised to make an Earth-normal human being out of you as soon as they found out from us how to do that. But the fact of the matter is that it can't be done at all, and you know it. And now there's no future for

you with us, either. I'm sorry for you, Donald, believe me; it's not your fault that they made you into a creature instead of a person. But you are nothing now but a bomb that's already gone off."

Sweeney had never known his father, and the hegemony of the Port cops had been too diffuse to instill in him any focussed, automatic respect for persons standing *in loco parentis*. He discovered, suddenly, that he was furious with Rullman.

"That's a silly damn speech," he said, staring down and across the desk at the seated, slightly bowed man. "Nothing's gone off yet. There's plenty of information I can give you that you might use, if you want to work to get it. Of course if you've given up in advance"

Rullman looked up. "What do you know?" he said, with some puzzlement. "You said yourself that it would be the computer on board this Capt. Meikiejon's ship that would decide the course of action. And you can't communicate effectively with Meikiejon. This is a strange time to be bluffing, Donald."

"Why would I bluff? I know more about what Earth is *likely* to do with my message than anybody else in the colony. My experience with Earth is more recent. I wouldn't have come to you at all if I'd thought the situation to be hopeless and if I hadn't carefully picked the one message to send to Meikiejon that I thought left the colony some hope. I'm not straddling. I'm on your side. To send no message at all would have been the worst possible thing to do. This way, we may have a grace period."

"And just how," Rullman said slowly, "can you expect me to trust you?"

"That's your problem," Sweeney said brusquely. "If I really am still straddling, it's because the colony's failed to convince me that my future lies here. And if that's the case, it's not alone and it's the colony's own fault for being so secretive with its own people."

"Secretive?" Rullman said, with open astonishment now.

"About what?"

"About the 'project.' About the original crime Earth wants you for. About why Earth wants you back you in particular,

**Dr.** Rullman."

"But that's common knowledge, Donald. All of it."

"Maybe so. But it isn't common to *me* and most of the



original settlers take it all so much for granted that they can't talk about it, except in little cryptic references, like a private joke everybody's supposed to know. But everybody doesn't; did you know that? I've found that about half your second generation here has only the foggiest notion of the past.

The amount of information available here to a newcomer whether he's newly arrived like me, or just plain newborn you could stick in a pinnah-bird's eye. And that's dangerous. It's why I could have betrayed the colony *completely* -if I hadn't decided against it, and you couldn't have stopped me." Rullman leaned back and was quiet for quite a long time.

"Children often don't ask questions when they think they're already expected to know the answers," he murmured. He looked considerably more thunderstruck than he had when Sweeney made his original announcement. "They like to appear knowing even when they aren't. It gives them status in their own eyes."

"Children and spies," Sweeney said. "There are certain questions neither of them can ask, and for almost the same reasons. And the phonier the children's knowledge actually is, the easier for the spy to get around among the adults."

"I begin to see," Rullman said. "We thought we were immune to spying, because an Earth spy couldn't live here without elaborate, detectable protections. But that was a problem in physics, and that kind of problem is soluble. We should have assumed so from the beginning. Instead, we made ourselves socially as vulnerable as possible."

"That's how I see it. I'll bet that my father wouldn't have let you get away with it if he'd been able to get away with you. He was supposed to have been an expert in that kind of thing. I don't know; I never knew him. And I suppose it's beside the point, anyhow."

"No," Rullman said. "It's very much to the point, and I think you've just proven it, Donald. Your father couldn't prevent it, but perhaps he's given us an instrument for repairing it."

"Meaning me?"

"Yes. Ringer or no ringer, the blood you carry and the genes have been with us from the beginning, and I know how they show their effects. I see them now. Sit down, Donald. I begin to hope. What shall we do?"

"First of all," Sweeney said, "please, please tell me what this colony is all about!"

It was a difficult assignment.

*Item:* the Authorities. Long before space travel, big cities in the United States had fallen so far behind any possibility of controlling their own traffic problems as to make purely political solutions chimerical. No city administration could spend the amount of money needed for a radical cure, without being ousted in the next elections by the enraged drivers and pedestrians who most needed the help.

Increasingly, the traffic problems were turned over, with gratitude and many privileges, to semi-public Port, Bridge and Highway Authorities: huge capital-investment ventures modelled upon the Port of New York Authority, which had shown its ability to build and/or run such huge operations as the Holland and Lincoln Tunnels, the George Washington Bridge, Teterboro, LaGuardia, Idlewild and Newark airports, and many lesser facilities. By 1960 it was possible to travel from the tip of Florida to the border of Maine entirely over Authority-owned territory, if one could pay the appropriate tolls (and didn't mind being shot at by the Poconos by embattled land-owners who were still resisting the gigantic Incadel project).

*item'*, the tolls. The Authorities were creations of the states, usually acting in pairs, and as such enjoyed legal protections not available to other private firms engaged in interstate commerce. Among these protections, in the typical enabling act, was a provision that "the two said states will not . . . diminish or impair the power of the Authority to establish, levy and collect tolls and other charges . . ." The federal government helped; although the Federal Bridge Act of 1946 required that the collection of tolls must cease with the payment of amortization, Congress almost never invoked the Act against any Authority. Consequently, the tolls never dropped; by 1953 the Port of New York Authority was reporting a profit of over twenty million dollars a year, and annual collections were increasing at the rate of ten per cent a year.

Some of the take went into the development of new facilities most of them so placed as to increase the take, rather than solve the traffic problem. Again the Port of New York Authority led the way; it built, against all sense, a third tube for the Lincoln Tunnel, thus pouring eight and a half million more cars per year into Manhattan's mid-town area, where the city was already strangling for want of any adequate ducts to take away the then-current traffic.

*Item:* the Port cops. The Authorities had been authorized from the beginning to police their own pretises. As the Authorities got bigger, so did the private police forces. By the time space travel arrived, the Authorities owned it. They had taken pains to see that it fell to them; they had learned from their airport operations which, almost alone among their projects, always showed a loss *taba.t* nothing less than total control is good enough. And characteristically, they never took any interest in any form of space-travel which did not involve enormous expenditures; otherwise they could take no profits from sub-contracting, no profits from fast amortization of loans, no profits from the laws allowing them fast tax writeoffs for new construction, no profits from the indefinitely protracted collection of tolls and fees after the initial cost and the upkeep had been recovered.

At the world's first commercial spaceport, Port Earth, it cost ship owners \$5000 each and every time their ships touched the ground. Landing fees had been outlawed in private atmosphere flying for years, but the Greater Earth Port Authority operated under its own set of precedents; it made landing fees for spacecraft routine. And it maintained the first Port police force which was bigger than the armed forces of the nation which had given it its franchise; after a while, the distinction was wiped out, and the Port cops *were the* armed forces of the United States. It was not difficult to do, since the Greater Earth Port authority was actually a holding company embracing every other Authority in the country, including Port Earth.

And when people, soon after spaceflight, began to ask each other, "How shall we colonize the planets?," the Greater Earth Port Authority had its answer ready.

*Item:* terraforming.

Terraforming remaking the planets into near-images of the Earth, so that Earth-normal people could live on them. Port Earth was prepared to start small. Port Earth wanted to move Mars out of its orbit to a point somewhat closer to the sun, and make the minor adjustments needed in the orbits of the other planets; to transport to Mars about enough water to empty the Indian Ocean only a pittance to Earth, after all, and not 10 per cent of what would be needed later to terraform Venus; to carry to the little planet top-soil about equal in area to the state of Iowa, in order to get started at growing plants which would slowly change the atmosphere

of Mars; and so on. The whole thing, Port Earth pointed out reasonably, was perfectly feasible from the point of view of the available supplies and energy resources, and it would cost less than thirty-three billion dollars. The Greater Earth Port Authority was prepared to recover that sum at no cost in taxes in less than a century, through such items as \$50 rocket-mail stamps, \$10,000 Mars landing fees, \$1,000 one-way strap-down tickets, 100-per-desert-acre land titles, and so on. Of course the fees would continue after the cost was recovered for maintenance.

And what, after all, the Authority asked reasonably, was the alternative? Nothing but domes. The Greater Earth Port Authority hated domes. They cost too little to begin with, and the volume of traffic to and from them would always be miniscule. Experience on the Moon had made that painfully clear. And the public hated domes, too; it had already shown a mass reluctance to live under them.

As for the governments, other than that of the United States, that the Authority still tolerated, none of them had any love for domes, or for the kind of limited colonization that the domes stood for. They needed to get rid of their pululating masses by the bucket-full, not by the eye-dropper-fuU. If the Authority knew that emigration increases the home population rather than cuts it, the Authority carefully re-framed from saying so to the governments involved; they could rediscover Franklin's Law for themselves. Domes were out; terraforming was in.

Then came pantropy.

If this third alternative to the problem of colonizing the planets had come as a surprise to the Authority, and to Port Earth, they had nobody to blame for it but themselves.

There had been plenty of harbingers. The notion of modifying the human stock genetically to live on the planets as they were found, rather than changing the planets to accommodate the people, had been old with Olaf Stapledon; it had been touched upon by many later writers; it went back, in essence, as far as Proteus, -and as deep into the human mind as the werewolf, the vampire, the fairy changeling, the transmigrated soul.

But suddenly it was possible; and, not very long afterwards, it was a fact.

The Authority hated it. Pantropy involved a high initial investment to produce the first colonists, but it was a method

which with refinement would become cheaper and cheaper. Once the colonists were planted, it required no investment at all; the colonists were comfortable on their adopted world, and could produce new colonists without outside help. Pantropy, furthermore, was at its *most* expensive less than half as costly as the setting-up of the smallest and least difficult dome. Compared to the cost of terraforming even so favorable a planet as Mars, it cost nothing at all, from the Authority's point of view.

And there was no way to collect tolls against even the initial expense. It was too cheap to bother with.

WILL YOUR CHILD BE A MONSTER?

If a number of influential scientists have their way, some child or grandchild of yours may eke out his life in the frozen wastes of Pluto, where even the sun is only a spark in the sky and will be unable to return to Earth until after he dies, *if then!*

Yes, even now there are plans afoot to change innocent unborn children into alien creatures who would die terribly the moment that they set foot upon the green planet of their ancestors. Impatient with the slow but steady pace of man's conquest of Mars, prominent ivory-tower thinkers are working out ways to produce all kinds of travesties upon the human form, travesties which will be able to survive, somehow, in the bitterest and most untamed of planetary infernos.

The process which may produce these pitiful freaks at enormous expense is called "pantropy." It is already in imperfect and dangerous existence. Chief among its prophets is white-haired, dreamy-eyed Dr. Jacob Rullman, who. . .

"Stop," Sweeney said.

He put his fingertips to his temples, and then, trembling, took them away again and looked at Rullman. The scientist put down the old magazine clipping, which even in its telfon sheath was as yellow as *paelta* after its half-life in Ganymede's air. Rullman's own hands were quite steady; and what there was left of his hair was as reddish-brown as ever.

"Those lies I'm sorry. But they work, I know they work. That's what they filled me up with. It's different when you realize how vicious they are."

"I know," Rullman said, gently. "It's easy to do. Bringing up an Adapted child is a special process, the child is always

isolated and anxious to imitate, you may tell it anything you wish; it has no choice but to believe, it's desperate for closer contact, for acceptance, for the embraces 'it can never have. It's the ultimate in bottle-babies: the breast that might have fed it may be just on the other side of the glass, but it also lies generations in the past. Even the voice of 'the mother comes along a wire if it comes along at all. I know, Donald, believe me. It happened to me, too. And it's very hard."

"Jacob Rullman was"

"My remote, immediate father. My mother died early. They often do, of the deprivation, I believe; like yours. But my father taught me the truth, there in the Moon caves, before he was killed."

Sweeney took a deep breath. "I'm learning all that now. Go on."

"Are you sure, Donald?"

"Go on. I need to know, and it's not too late. Please."

"Well," Rullman said reflectively, "the Authority got laws passed against pantropy, but for a while the laws didn't have many teeth; Congress was leary of forbidding vivisection at the same time, and didn't know exactly what it was being asked to forbid; Port didn't want to be too explicit. My father was detennined to see pantropy tried while the laws still provided *some* loopholeshe knew well enough that they'd be stiffened as soon as Port thought it safe to stiffen them. And he was convinced that we'd never colonize the stars by dome-building or terraforming. Those might work on some of our local planetsMars, Venusbut not outside."

"Outside? How would anybody get there?"

"With the interstellar drive, Donald. It's been in existence for decades, in fact for nearly half a century. Several exploratory voyages were made with it right after it was discovered, all of them highly successfulthough you'll find no mention of them in the press of the time. Port couldn't see any profit emerging out of interstellar flight and suppressed the news, sequestered the patents, destroyed the records of the trips insofar as it could. But all the Port ships have the overdrive, just in case. Even our ship has it. So does your ferry-pilot friend up there."

Sweeney shut up.

"The thing is this: most planets, even right here inside the solar system, won't sustain domes to begin with, and can't be terraformed in any even imaginable way. Jupiter, for in-

stance. And too many others will yield to either procedure too slowly, and too unprofitably, to tempt Port. Over interstellar distances, Port won't even try, since there'd be no trade or traffic it could collect against.

"Pantropy was the obvious answer for Port, certainly, but for man's future in general. Somehow, my father sold that idea to some politicians, and to some people with money, too. He was even able to find several survivors of those early interstellar expeditions, people who knew some of the extra-solar planets *and* the operation of the overdrive. All these people wanted to make at least one demonstration experiment in pantropy, an open-ended one which would lead to others if it succeeded. .

"We are that experiment: this colony on Ganymede.

"Port had it outlawed before it was fairly started, but by the time they found the Moon labs it was too late; we got away. It was then that they put teeth into the laws, and made them retroactive; they had to kill pantropy, and they knew it.

"And that is why, our very existence is a crime, Donald.

And it is an absolute requirement of Port's policy that the colony be a failure, and that they *be able to prove it*. That's why they want us back. They want to be able to exhibit us, to show what helpless freaks we are on Earth, and to fell their people that we couldn't get along on Ganymede either, and had to be bailed out of our own mess.

"After that well, there are those phony commerce-raiding charges you told me about. We'll be tried. We'll be executed, most likely, by exposing us in public to Earth-normal conditions. It would be a fine object-lesson; indeed, the finishing touch."

Sweeney crouched down in his chair, utterly revolted by the first complete emotion he had ever experienced: loathing for himself. He understood, now, the overtones in Pullman's voice. Everyone had been betrayed everyone!

The voice went on without mercy, piling up the ashes. "Now, as for the project, our project that is, that's equally as simple. We know that in the long run human beings can't colonize the stars without pantropy. We know that Port won't allow pantropy to be used. And we know, therefore, that we ourselves have to carry pantropy to the stars, before Port can head us off. One, two, three, infinity.

"So that's what we're going to do, or *were* going to do.

We've got our old ship fitted out for the trip, and we've got a

new generation of children just a small number trained to operate it, and adapted for well, for some place. The kids can't live on Earth, and they can't live on Ganymede; but they can live on one of six different extra-solar planets we've picked out each one of which is at a different compass-point, and at a different distance from Sol. I know the names of only two of them, the kids are the only ones who know the rest. Which one they'll actually go to will be decided only after they're aloft and on their way. Nobody who stays behind will be able to betray them. Earth will never find them.

"There will be the beginning of the most immense 'seeding program' in man's history: seeding the stars with people.">// we can still manage to get it off the ground."

In the silence that followed, the door of RuUman's office opened quietly, and Mike Leverault came in, looking pre-occupied and carrying a clipboard. She stopped when she saw them, and Sweeney's heart constricted on the thawing slush inside its stiffly pumping chambers.

"Excuse me," she said. "I thought . . . Is there something wrong? **You** both look so grim"

"There's something wrong," RuUman said. He looked at Sweeney.

A corner of Sweeney's mouth twitched, without his willing it. He wondered if he were trying to smile, and if so, about what.

"There's no help for it," he said. "Dr. Rullman, your colonists will have to revolt against you."

The starshell burst high, perhaps three miles up. Though it was over the western edge of the plateau, enough light spilled down to the floor of the Gouge to checker the rocking, growling halftrack.

The sound, however, was too faint to break through the noise of the turbines, and Sweeney wasn't worried about the brief light. The truck, pushing its way north at a good twenty miles an hour beneath the wild growth, would be as difficult to detect from the air as a mouse running among roots.

Besides, nobody would be likely to be looking into the Gouge now. The evidences of battle sweeping the highlands were too compelling; Sweeney himself was following them tensely.

Mike was doing the driving, leaving Sweeney free to crouch in the tool- and instrument-littered tonneau by the big aluminum keg, watching the radar screen. The paraboloid basket-



work of the radar antenna atop the truck was not sweeping; it was pointing straight back along the way he and Mike had come, picking up a microwave relay from the last automatic station that they had passed. The sweeping was being done for Sweeney, by the big radio-telescope atop Howe's *pi*. Sweeney paid little attention to the near, low, fast streaks on the screen. They were painted there by rocket ordnance of low calibre part of the fighting which had no bearing on the overall pattern. That pattern was already clear: it showed, as it had for days, that the insurgent forces still held the mountain and its heavy weapons, but that the attacking salient from the loyalists' camp up north was maintaining the initiative, and was gathering strength.

It had developed into a running stalemate. Though the insurgents had obviously managed to drive the loyalists out of Howe's *pi*, perhaps by some trick with the ventilators, perhaps by some form of guerrilla warfare, they were equally evidently no match for the loyalists in the field. There they were losing ground twice as fast as they had originally taken it. The supporting fire from the mountain didn't seem to be helping them much; it was heavy, but it was terribly inaccurate. The frequent starshells told their own story of bad visibility and worse intelligence. And the loyalists, ousted though they were, had all the planes; they had the effrontery to fly them over the lines with riding lights.

What the loyalists would do when confronted with the problem of retaking the mountain was another question. Nothing short of very heavy stuff would make much of a dent on Howe's *pi*. And, even overlooking the fact that the heavy stuff was all inside the mountain, it would be suicide for *either* force to use it on Ganymede. The fighting hadn't become that bitter, yet. But it yet might.

And the Earth ships that showed on the screen inside the halftrack knew it. That much showed clearly by their disposition. They were there, almost surely, because they had deduced that Sweeney was leading the insurgents but they showed no desire to draw in and give Sweeney a hand. Instead, they stood off, a little inside the orbit of Callisto, about 900,000 miles from Ganymede far enough to give themselves a good running start if they saw an atomic spark on Ganymede, *close* enough to bail Sweeney out once it seemed that he had gained the victory anyhow.

Mike's voice, shouting something unintelligible, came back

to him mixed in with the roaring of the halftrack's turbines. "What's the matter?" he shouted, cocking his head.

". . . that rock-tumble ahead. If it's as . . . before . . . probably break the beam."

"Stop her," Sweeney shouted. "Want another reading."

The halftrack halted obediently, and Sweeney checked his screen against RuUman's readings, which showed on tumblers snicking over on a counter near his elbow. It checked; 900,-000 was close enough. Maybe a little closer, .but not much. The wave-front of a full satellary explosion would cross that distance in about five seconds, carrying instant obliteration with it; but five seconds would be long enough to allow the automatics on the Earth ships to slam them away on trans- . finite drive.

He slapped her on the shoulder, twice. "Okay so far. Go ahead."

Her reply was lost, but he saw her crash-helmet nod, and the truck began to cant itself slowly and crazily up a long, helter-skelter causeway of boulders and rubble: a sort of talus-slope, one of many rolled each year into the Gouge by exfoliation in the cliffs. Mike turned and smiled back at him gleefully, and he smiled back; the treads were clanking too loudly to permit any other answer.

The whole scheme had depended from the beginning upon so long a chain of *ifs* that it could still fall apart at any moment and at any flawed link. It had been dependable only at the beginning. The signal Sweeacy had sent Meikiejon WANYhad told Meikiejon nothing, since he didn't know the code; but it had told the computer that Sweeney still lacked custody of the Adapted Men that Earth wanted, but that he had the help he thought he would need in getting that custody eventually. That much was a known. What orders the computer would rap out for Meikiejon in response comprised the first of the *ifs*.

The computer might, of course, react with some incredibly bold piece of gamemanship too remote from normal human thinking to be even guessable; Shannon's chess-playing machines sometimes won games from masters that way, though more usually they could barely hold their own against dubs. Since there was no way to anticipate what such a gambit would be like, neither Sweeney nor Rullman had wasted any time trying to pretend that there was.

But the other alternative was much more likely. The ma-

chine would assume that Sweeney was safe, as was evidenced by the arrival of the coded signal; and that if he had help he could only have gathered about him a secret core of disaffected colonists, a "Loyal Ganymedian Underground" or equivalent. Earth would assume, and would build the assumption into the computer, that many of the colonists were dissatisfied with their lives; it was a hope that Earth could turn into a fact without being aware of the delusion, since nobody on Earth could suspect how beautiful Ganymede was. And the computer would assume, too, that it might be only a matter of time before Sweeney also had custody, and would be sending Meikiejon WAWYor maybe even YYAWY.

"How will we know if it does?" Rullman had demanded.

"If it does, then the deadline will pass without Meikiejon's making a move. He'll just stick to his orbit until the computer changes his mind. What else could it tell him to do, anyhow? He's just one man in a small ship without heavy armament. And he's an Earthman at that he couldn't come down here and join my supposed underground group even if the idea occurred to him. He'll sit tight."

The halftrack heaved itself over an almost cubical boulder, slid sidewise along its tilted face, and dropped heavily to the bed of smaller rounded stones. Sweeney looked up from the radar controls to see how the big aluminum keg was taking the ride. It was awash in a sea of hand tools—picks, adzes, sledges, spikes, coils of line rapidly unwinding—but it was securely strapped down. The miracle of fireworks chemistry (and, specifically, Ganymedian chemistry) still slumbered inside it. He clambered forward into the cab beside Mike and strapped himself down to enjoy the ride.

There was no way to predict or to calculate how long an extension of the deadline the machine on Meikiejon's ship would allow Sweeney for the launching of his insurrection. The colony worked as though there would be no grace period at all. When the deadline passed without any sign that Meikiejon even existed though the radio-telescope showed that he was still there Sweeney and Rullman did not congratulate each other. They could not be sure that the silence and the delay meant what they had every good reason to hope that it meant. They could only go on working.

The movements of machines, men, and energy displays which should look to Meikiejon like a revolt of the colonists burst away from Howe's *pi* eleven days later. All the signs

showed that it had been the loyalists who had set up their base near the north pole of Ganymede. Sweeney and Mike had driven through the Gouge before, for that purpose, planting in a radar-crazy jungle a whole series of small devices, all automatic, all designed to register on Meikiejon's detectors as a vast bustle of heavy machinery. The visible strategic movements of the opposing armies had suggested the same loyalist concentration at the pole.

And now Sweeney and Mike were on their way back.

The computer appeared to be waiting it out; Meikiejon had evidently fed the data to it as a real rebellion. Sweeney's side obviously was carrying the field at first. The computer had no reason to run a new extrapolation up to the first day the loyalist forces had managed to hold their lines; and then it had to run squarely up against the question of how the loyalists could take the mountain even if, in the succeeding weeks, they should sweep the field clear of Sweeney.

"Kid stuff," Sweeney had said. "It hasn't any reason to think differently. Too simple to make it extrapolate beyond the first derivative."

"You're very confident, Donald."

Sweeney stirred uneasily in the bucket seat as he recalled RuUman's smile. No Adapted Man, least of all Sweeney, had had any real childhood; no "kid stuff." Fortunately the Port cops had thought it essential to Sweeney's task that he know theory of games.

The halftrack settled down to relatively smooth progress once more, and Sweeney got up to check the screen. The talus-slope, as Mike had anticipated, cut off reception from the radar relay station behind them; Sweeney started the antenna sweeping. Much of the field was cropped by the near edge of the Gouge, but that effect would begin to disappear gradually from the screen now. The floor of the Gouge rose steadily as one approached the north pole, although it never quite reached the level of the plains. He could already capture enough sky to be satisfied that the Earth ships were just where they had been before.

That had been the last risk: that Meikiejon, alarmed at the computer's continued counsels of inaction, would radio Earth for advice from higher authorities. Obviously a colonists' *revolt* on Ganymede, one that could be painted as a "We want to go home" movement, would be ideal for Earth's purposes. Earth would not only insist on Meikiejon's sitting tight as his

computer had told him to do but would also hasten to bring up reinforcements for Sweeney, just in case.

Both Sweeney and RuUman had known how likely that was to happen, and had decided to take the chance, and make preparations against it. The chance had not paid off the Earth ships were here but it still looked as though the preparations might.

As content as was possible under the circumstances, Sweeney went forward. Before reaching for his safety belt, he stopped to kiss Mike, to the considerable detriment of her control of the lurching truck.

The explosion threw him, hard, halfway across the empty bucket seat.

He struggled up, his head ringing. The truck's engines seemed to have stopped; beneath the ringing, he could hear nothing but the sound of the blowers.

"Doni Are you all right? What was that?"

"Ugh," he said, sitting down. "Nothing broken. Hit my head a crack. It was high explosive, from the sound. A big one."

Her face was pinched and anxious in the soft glow from the dashboard. "One of ours? Or"

"I don't know, Mike. Sounded like it hit back down the ravine a distance.. What's the matter with the engine?"

She touched the starter. It whined, and the engine caught at once. "I must have stalled it," she said apologetically. She put it in gear. "But it doesn't feel right. The traction's bad on your side."

Sweeney swung the cab door open and dropped to the stony ground. Then he whistled.

"What is it?"

"That was closer than I thought," he called back. "The righthand track is cut almost in half. A flying rock splinter, I suppose. Toss me the torch."

She leaned far out across his seat, reaching the arc-cutter to him, and then the goggles. He made his way to the rear of the truck and snapped the switch. The electric arc burned sulfur-blue; a moment later, the damaged track was unwinding from around the four big snowmobile tires like an expiring snake. Dragging the cord behind him, Sweeney cut the left track off, too, and then returned to the cab, rewinding the cord as he went.

"Okay, but take it slow. Those tires are going to be cut to

ribbons by the time we hit that base."

Her face was still white, but she asked no more questions. The halftrack began to crawl forward, a halftrack no longer. At a little over two miles farther on, the first of the eight tires blew, making them both jump. A hasty check showed that it was the right outside rear one. Another two and a half miles, and the right inside drive tire blew out, too. It was bad to have two gone on the same side of the truck, but at least they were on different axles and in alternate position. The next one to go, five miles farther on the ground became less littered as it rose as the left inside rear.

"Don."

"Yes, Mike."

"Do you think that was an Earth bomb?"

"I don't know, Mike. I doubt it; they're too far away to be throwing stuff at Ganymede except at random, and why would they do that? More likely it was one of our torpedoes, out of control." He snapped his fingers. "Wait a minute. If we're throwing H.E. at each other, now, the cops will have noticed, and *that* we can check."

*Bang!*

The halftrack settled down to the right and began to slobber at the ground. No check was needed to tell Sweeney that that one had been the right outside driver. Those two wheels would be hitting on bare rims within the next thousand feet or so of travel; the main weight of the vehicle was back there *the* steering tires took very little punishment, comparatively.

Gritting his teeth, he unbuckled the safety and scrambled back to the radar set, checking the aluminum drum automatically as he went.

There was much more sky showing on the screen now. It was impossible to triangulate the positions of the Earth ships now that the transmission from Howe's *pi* was cut off, but the pips on the screen were markedly dimmer. Sweeney guessed that they had retreated at least another hundred thousand miles. He grinned and leaned into Mike's ear.

"It was one of ours," he said. "Rullman's stepping up on the heavy artillery, that's all. One of his torpedo pilots must have lost one in the Gouge. The Port cops have detected the step-up, all right they've backed off. It's beginning to look more and more as though the rebels might try to smear the loyalist base with a fission bomb, and they don't want to be

cheek to cheek with the planet "when that happens. How far do we have to go, still?"

Mike said, "We're"

*Bang!* Mike grabbed for the switch, and the engine died.

"here," she finished, and then, amazingly, began to giggle.

Sweeney swallowed, and then discovered that he was grinning, too. "With three track-tires intact," he said. "Hooray for us. Let's get on the job."

Another starshell broke open in the sky, not as near as before. Sweeney went around to the back of the truck, Mike picking her way after him, both of them looking ruefully at the wreathes of shredded silicone rubber which once had been two excellent tires. Two of the rims were quite bare; the fifth deflated tire, which had not been driven on, was only a puncture and might be salvaged.

"Unstrap the barrel and roll 'er out the tailgate," Sweeney said. "Easy. Now let's lower 'er to the ground, and over there." All around them, concealed among the rocks and the massive, gnarled trunks, were the little instruments whose busy electronic chattering made this spot sound like a major military encampment to the ships lying off Ganymede. Photographs, of course, would not be expected to show it: the visible light was insufficient, the infra-red still weaker, and ultra-violet plates would be stopped by the atmosphere. Nobody would expect to see anything from space by any method, not in the Gouge; but the detectors would report power being expended, and power sources moving about and rebel torpedoes homing purposefully on the area. That should be enough.

With Mike's help, Sweeney stood the aluminum barrel on end roughly in the center of this assemblage. "I'm going to take that punctured tire off," he said. "We've got fifteen minutes until take-off time, and we may need it later. Know how to wire up this thing?"

"I'm not an idiot. Go change your tire."

While Sweeney worked, Mike located the main input lead for the little invisible chatterers and spliced a line into it. To this she rigged a spring-driven switch which would snap to "Off" as soon as current was delivered to a solenoid which actuated its trigger. One strand of reel-wound cable went to the solenoid, another to a red-splashed terminal on the side of the aluminum keg. She checked the thumb-plunger at the other end of the cable. Everything was ready. When that

plunger was pushed, the little chatterers would go Off, at the same moment that the barrel went On.

"AH set, Mike?"

"Ready and waiting. Five minutes until take-off time."

"Good," Sweeney said, taking the reel from her. "You'd ~ better get in the truck and take it on across the poleover the horizon from here."

"Why? There's no real danger. And if there is, what good would I be over there alone?"

"Look, Mike," Sweeney said. He was already walking backwards, still to the north, paying out cable. "I just want to get that truck out of here; maybe we can use it, and once that barrel starts, it just might set the truck on fire. Besides, supposing the cops decide to take a close look down here? The truck's visible, or at least it's suspiciously regular. But they couldn't see *me*. It'd be far better to have the truck over the horizon. Fair enough?"

"Oh, all right. Just don't get yourself killed, that's all."

"I won't. I'll be along after the show's over. Go on, beat it."

Scowling, though not very convincingly, she climbed back into the truck, which pulled slowly away up the grade. Sweeney could hear its bare rims screeching against upthrusts of rock long after it had disappeared, but finally it was out of earshot as well.

He continued to walk backward, unwinding the cable from the reel until it was all gone, and the phony encampment was a full mile south of him. He took the thumb switch in his right hand, checked his watch, and crouched down behind a long low spur to wait.

A whole series of starshells made a train of blue suns across the sky. Somewhere a missile screamed, and then the ground shook heavily. Sweeney fervently hoped that the "insurgent" torpedomen weren't shaving it too fine.

But it wouldn't be long now. In just a few seconds, the survival shipthe ship aimed at one of six unknown stars, and carrying the new generation of Adapted childrenwould take off from Howe's *pi*.

Twenty seconds.

Fifteen.

Ten.

Nine.

Eight.

Seven.



Six.

Sweeney pushed the plunger.

The aluminum keg ignited with a hollow cough, and all intense ball of light, far too bright to be shut out either by the welding goggles or by closed eyelids or by both, rose into Ganymede's sky. The heat struck against Sweeney's skin as strongly as the backwash of the JATO unit had done, so long ago. The concussion, which followed about nine seconds later, flattened him and made his nose bleed.

Uncaring, he rolled over and looked upward. The light had already almost died. There was now a roiling column of white smoke, shot through with lurid, incandescent colors, hurling itself skyward at close to a mile a minute.

It was altogether a hell of a convincing-looking fission bomb for a fake.

The column didn't begin to mushroom until it was almost five miles high, but by that time Sweeney was sure that there wasn't an Earth ship anywhere within ten astronomical units of Ganymede. Nobody would stop to make inquiries, especially when all the instruments in the "encampment" had stopped transmitting simultaneously with the "blast."

It might perhaps occur to Port later that the "blast" might have been a huge, single-shot Roman candle fired from an aluminum keg, propelled by a mixture of smoke-flare compounds and low-grade chemical explosives. But by that time, the survival ship would be gone beyond all possibility of tracing its path.

As a matter of fact, it was gone already. It had left on the count, uncounted, by Sweeney, of Zero.

Sweeney got up, humming cheerfully and quite as tunelessly as Rullman and continued to plod north. On the other side of the pole, the Gouge was supposed to continue to become shallower as it proceeded into the Jupiter-ward hemisphere of Ganymede. There was a twilight zone there, illuminated by the sun irregularly because of libration while Ganymede was on the sunward side of Jupiter, and quite regularly as the satellite went toward and away from occultation with the big primary. Of course the occultation periods would be rather cold, but they lasted less than eight hours apiece.

Elsewhere on Ganymede, the other colonists were heading for similar spots, their spurious war equipment destroyed, their purpose fulfilled. They were equipped variously, but all as well as Sweeney; and he had a sound ten-wheeled snow-

mobile, on which the six remaining tires could be redistributed to make the vehicle suitable for heavy tractoring, and with a tonneau loaded with tools, seeds, slips and cuttings, medical supplies, reserve food and fuel. He also had a wife.

Earth would visit Ganymede, of course. But it would find nothing. The inside of Howe's *pi* had been razed when the survival ship had *taken off*. As for the people, they would be harmless, ignorant, and *widely scattered*.

Peasants, Sweeney thought. Whistling, he crossed the north pole. Nothing but peasants.

At last he saw the squat shape of the truck, crouched at the mouth of a valley. At first Mike was not visible, but finally he spotted her, standing with her back to him on a rise. He clambered up beside her.

The valley was narrow for about a hundred feet ahead, and then it opened out in a broad fan of level land. A faint haze hovered over it. To an Earthman, nothing could have looked more desolate but no Earthman was looking at it.

"I'll bet that's the best farm land on Ganymede," Sweeney whispered. "I wish"

Mike turned and looked at him. He cut the wish off unspoken, but there was no doubt that Mike had fathomed it. But Rullman was no longer on Ganymede to share its beauties - this one, or any other. Though he would never see the end of the journey, and could not have survived at its goal, he had gone with the children on the ship - and taken his exportable knowledge with him.

He had been, Sweeney knew, a great man. Greater, perhaps, than his father.

"Go on ahead with the truck, Mike," Sweeney said softly.

"I'll walk on behind you."

"Why? It'll ride easy on that soil - the extra weight won't matter."

"I'm not worrying about the weight. It's just that I want to walk it. It's-well, hell, Mike, don't you know that I'm just about to be born? Whoever heard of a kid arriving with a fourteen-ton truck?"